

# EXHIBIT 31



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Cho et al.

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(54) **PORTABLE COMPUTER AND METHOD FOR MOUNTING A FLAT DISPLAY DEVICE MODULE**

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(73) Assignee: **LG Philips LCD Co., Ltd.**, Seoul (KR)

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(52) **U.S. Cl.** ..... **361/681**; 361/682; 361/683; 349/58

(58) **Field of Search** ..... 361/679-683; 292/8, 56, 32, 94, 11; 248/917-923; 349/58, 59, 60; 16/342, 307

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*Primary Examiner*—Darren Schuberg

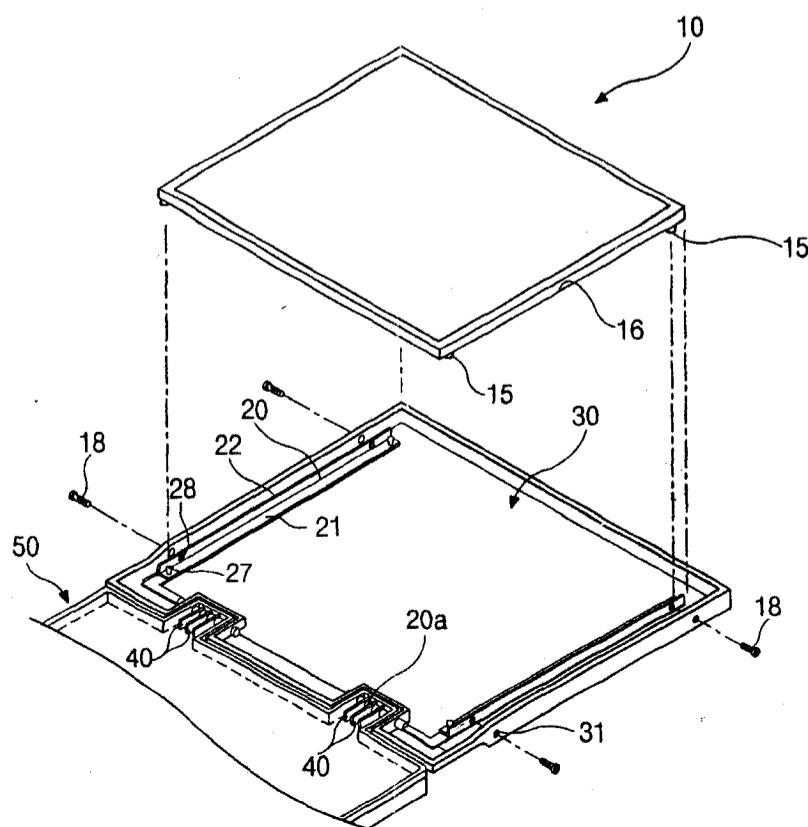
*Assistant Examiner*—Yean Hsi Chang

(74) **Attorney, Agent, or Firm**—Long Aldridge & Norman LLP

(57) **ABSTRACT**

Disclosed is a computer that includes: a system body having an input device; a display module having a display surface and a rear surface; a display case having a side wall surface; and a hinge pivotally coupling the body to the display module, the hinge including a hinge frame having first and second surfaces, the first surface coupled with the rear surface of the display module, the second surface coupled with the side wall surface of the display case.

**31 Claims, 14 Drawing Sheets**

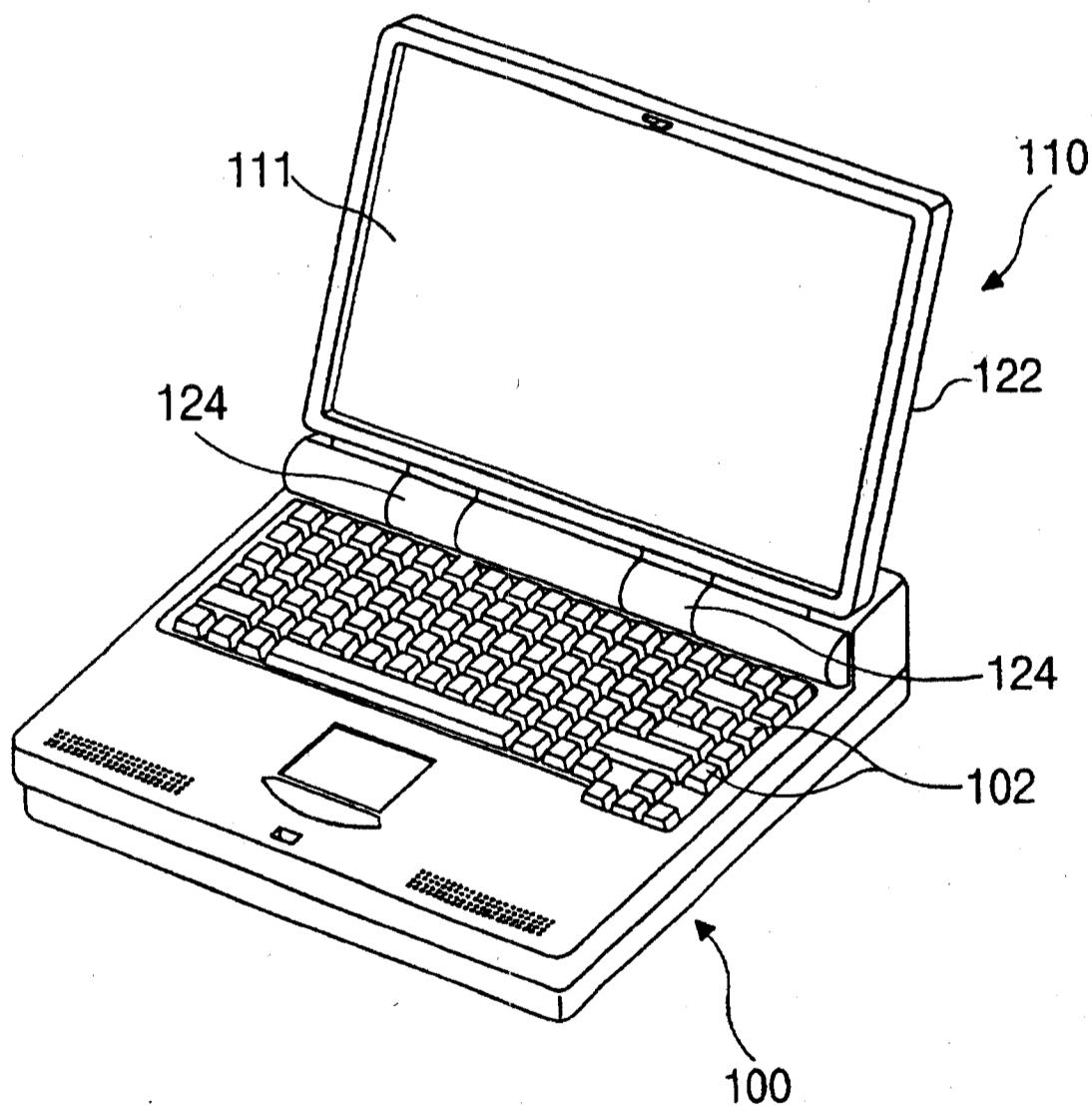


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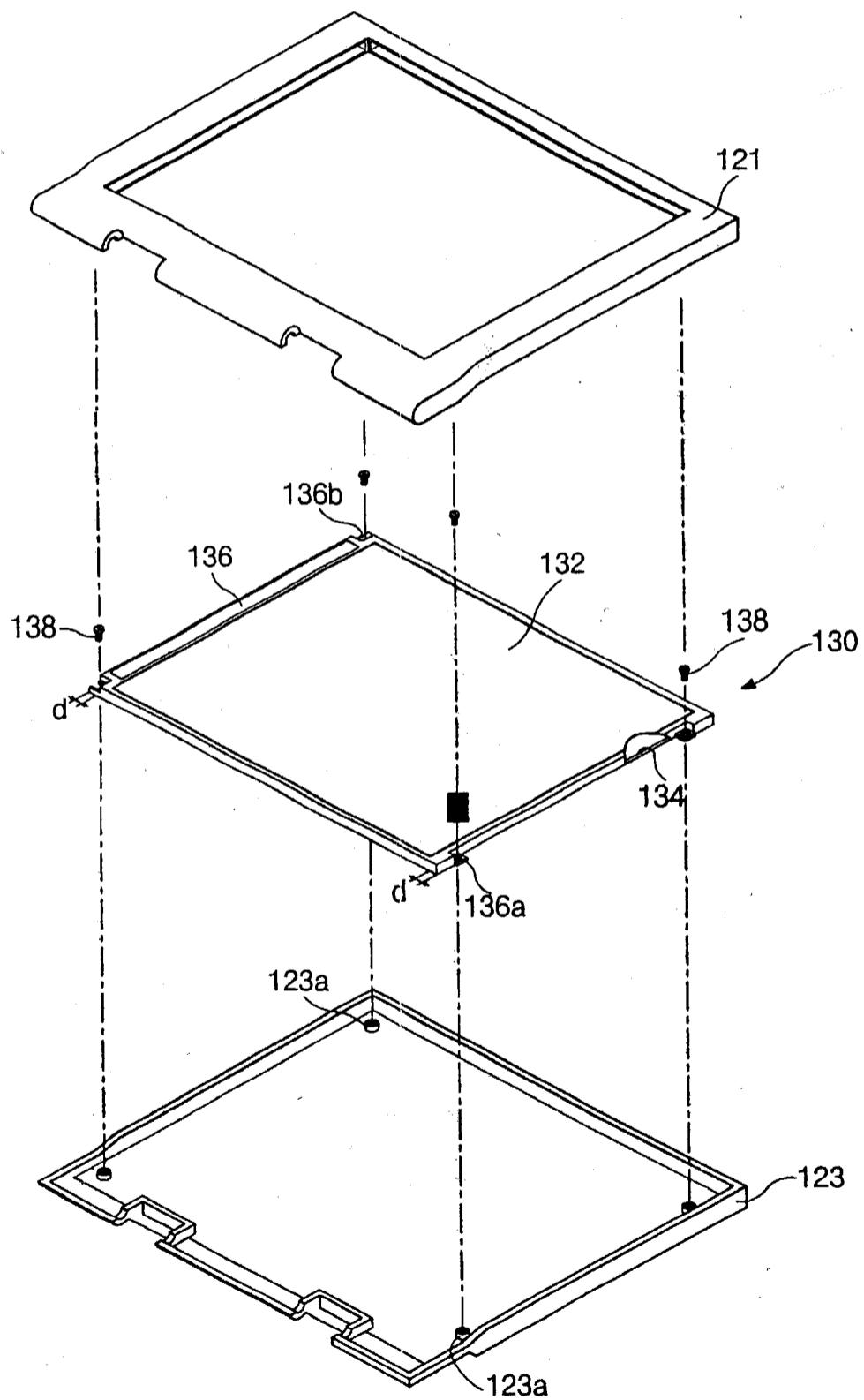
***FIG. 1***

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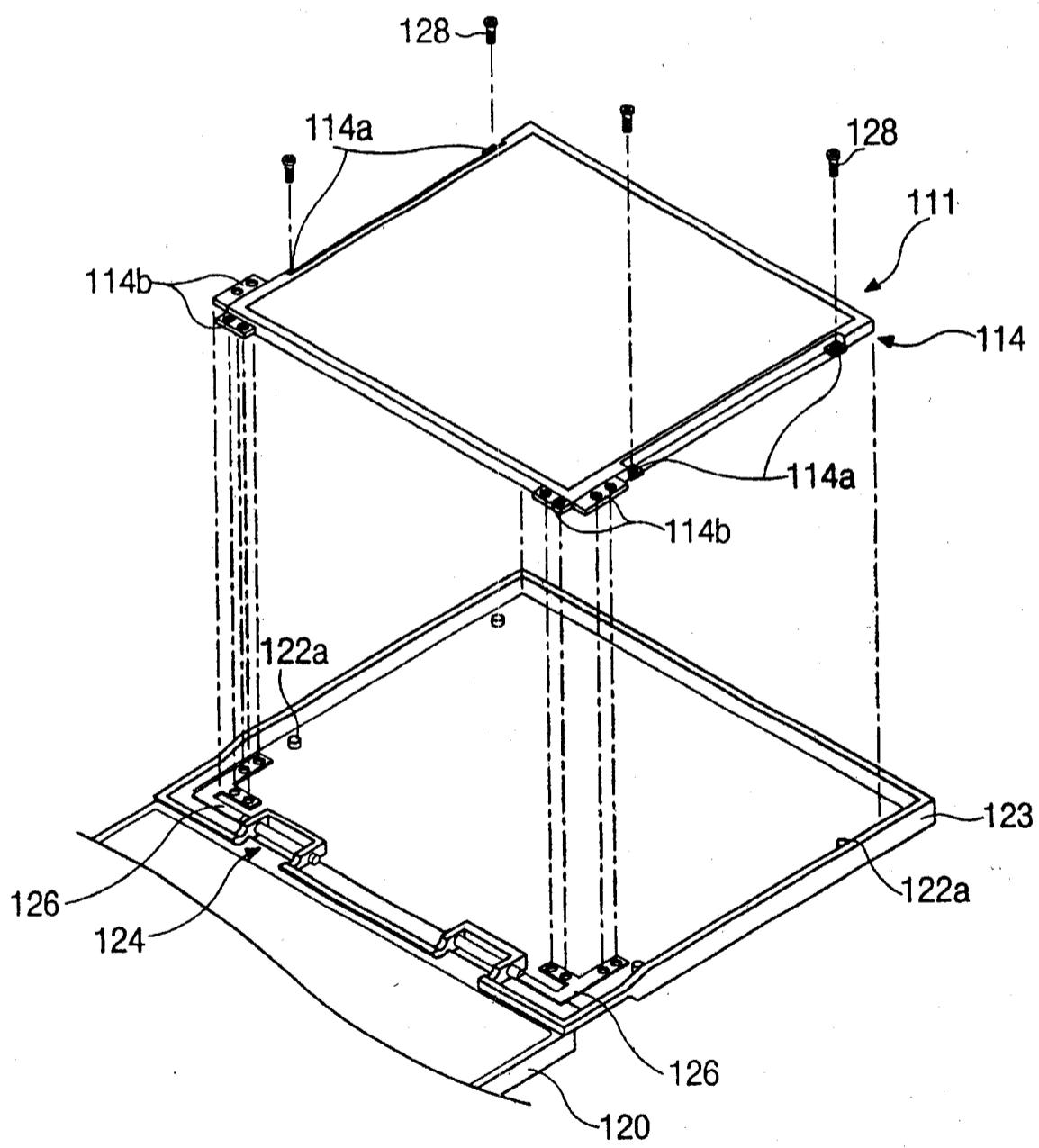
**FIG. 2**

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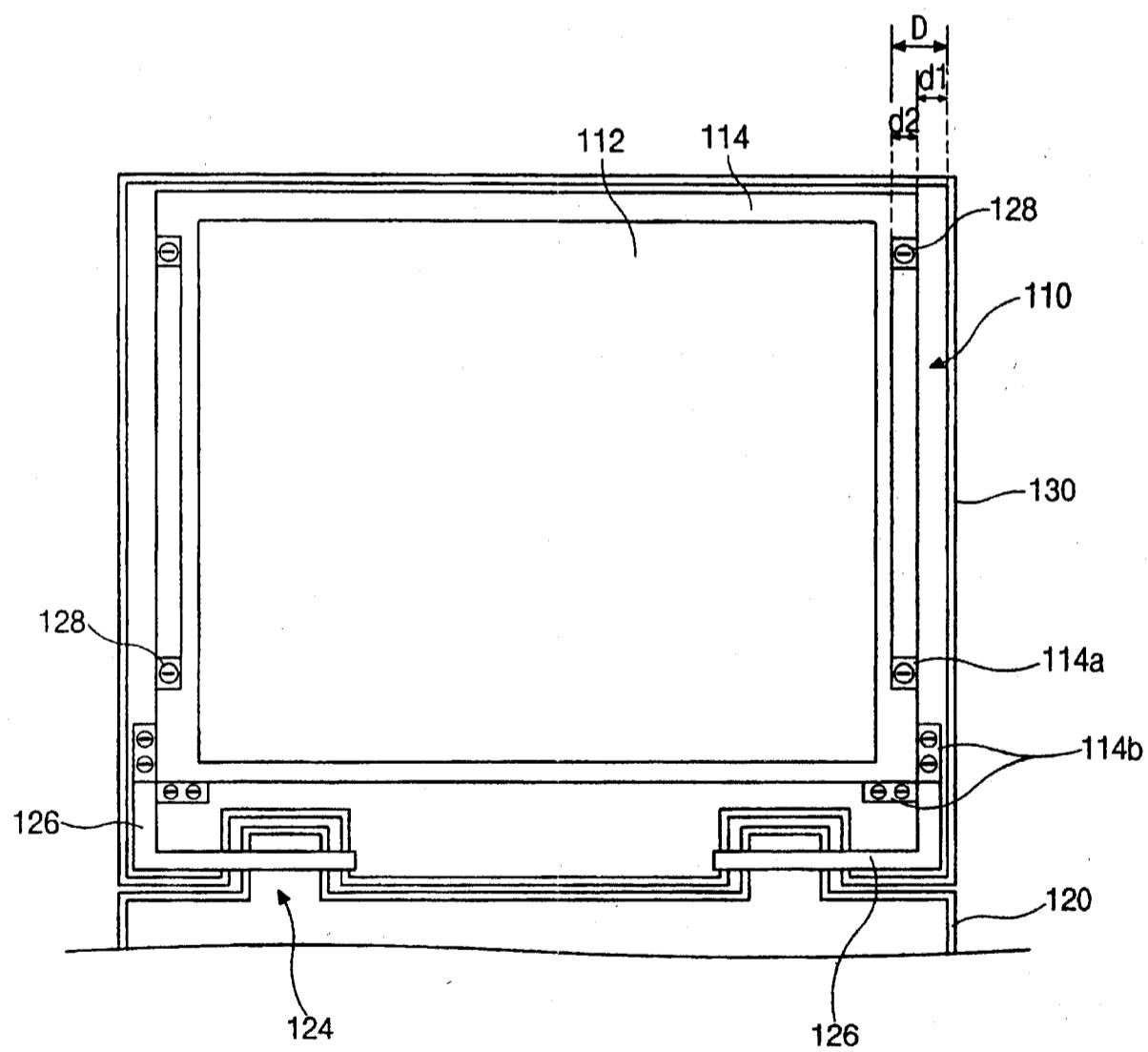
**FIG. 3A**

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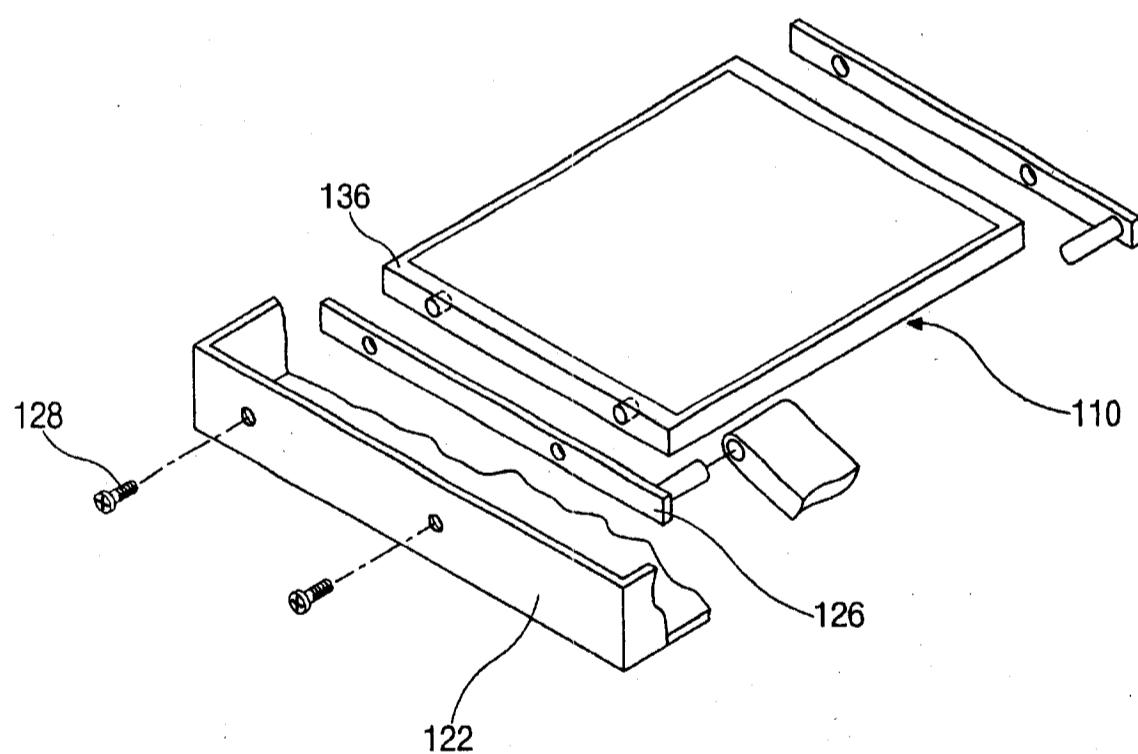
**FIG. 3B**

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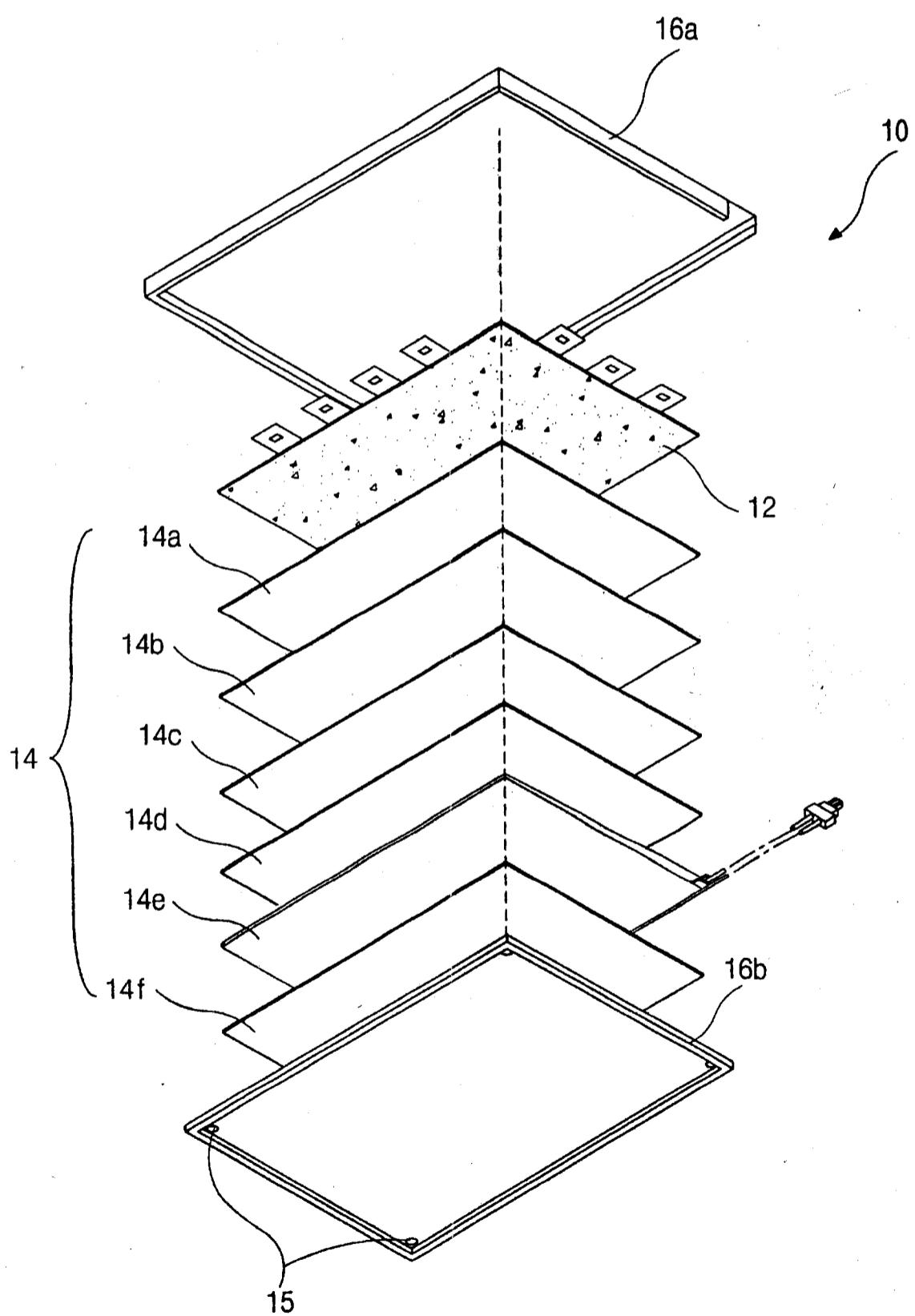
**FIG. 4**

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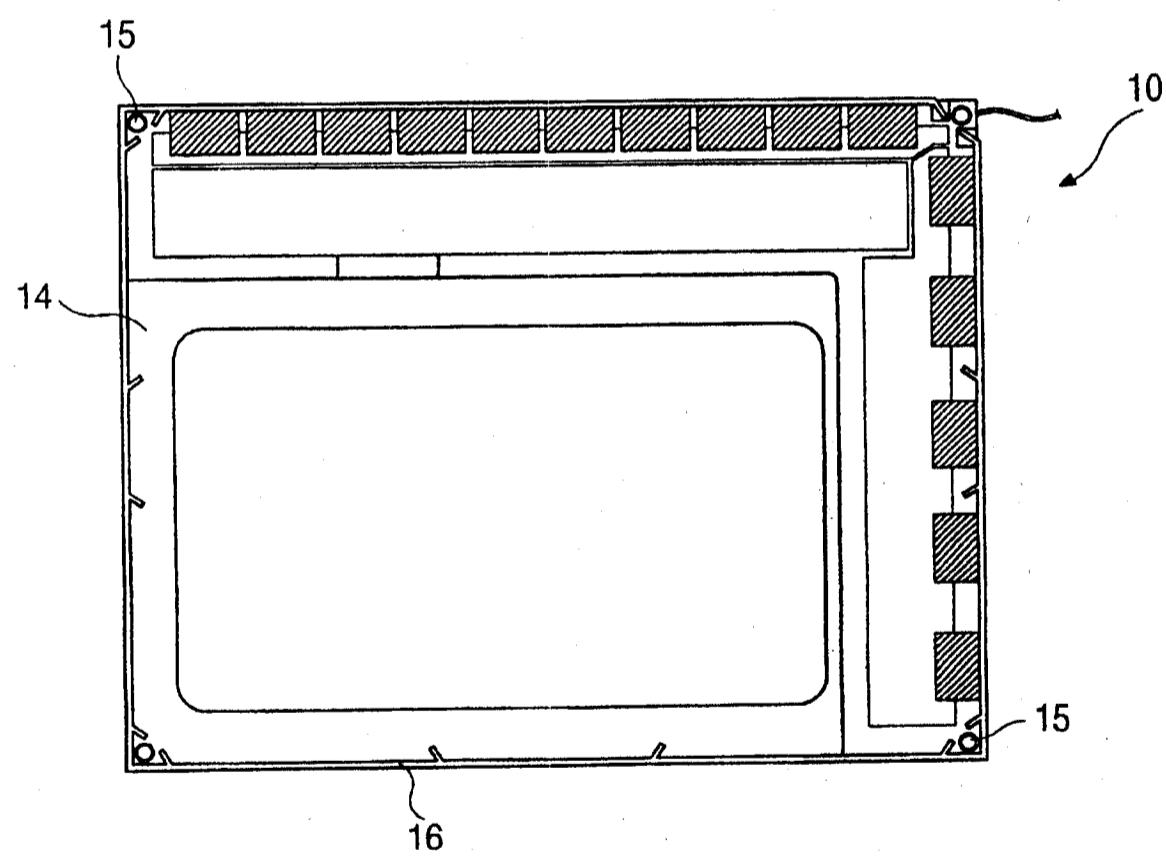
**FIG. 5**

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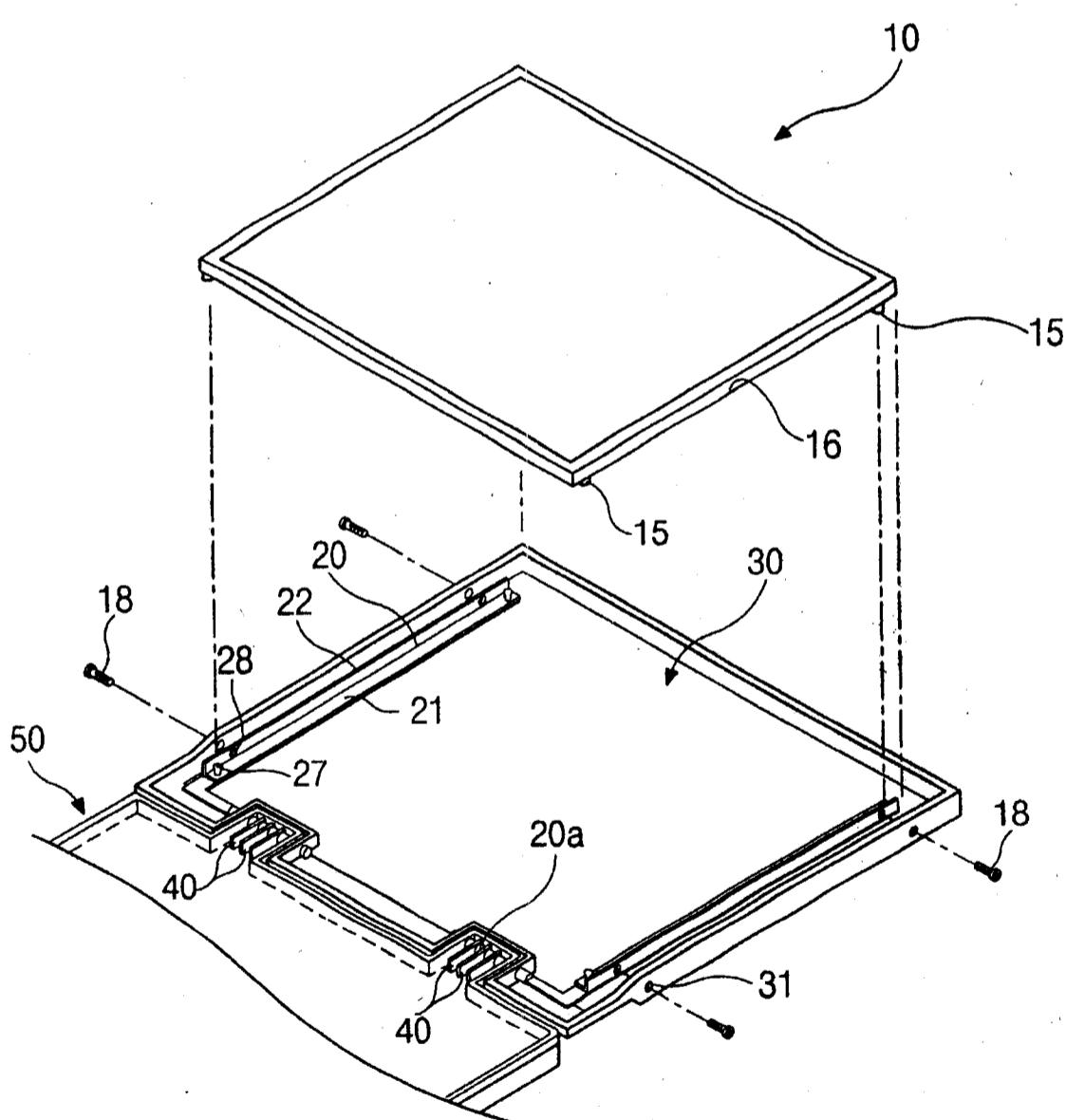
**FIG. 6**

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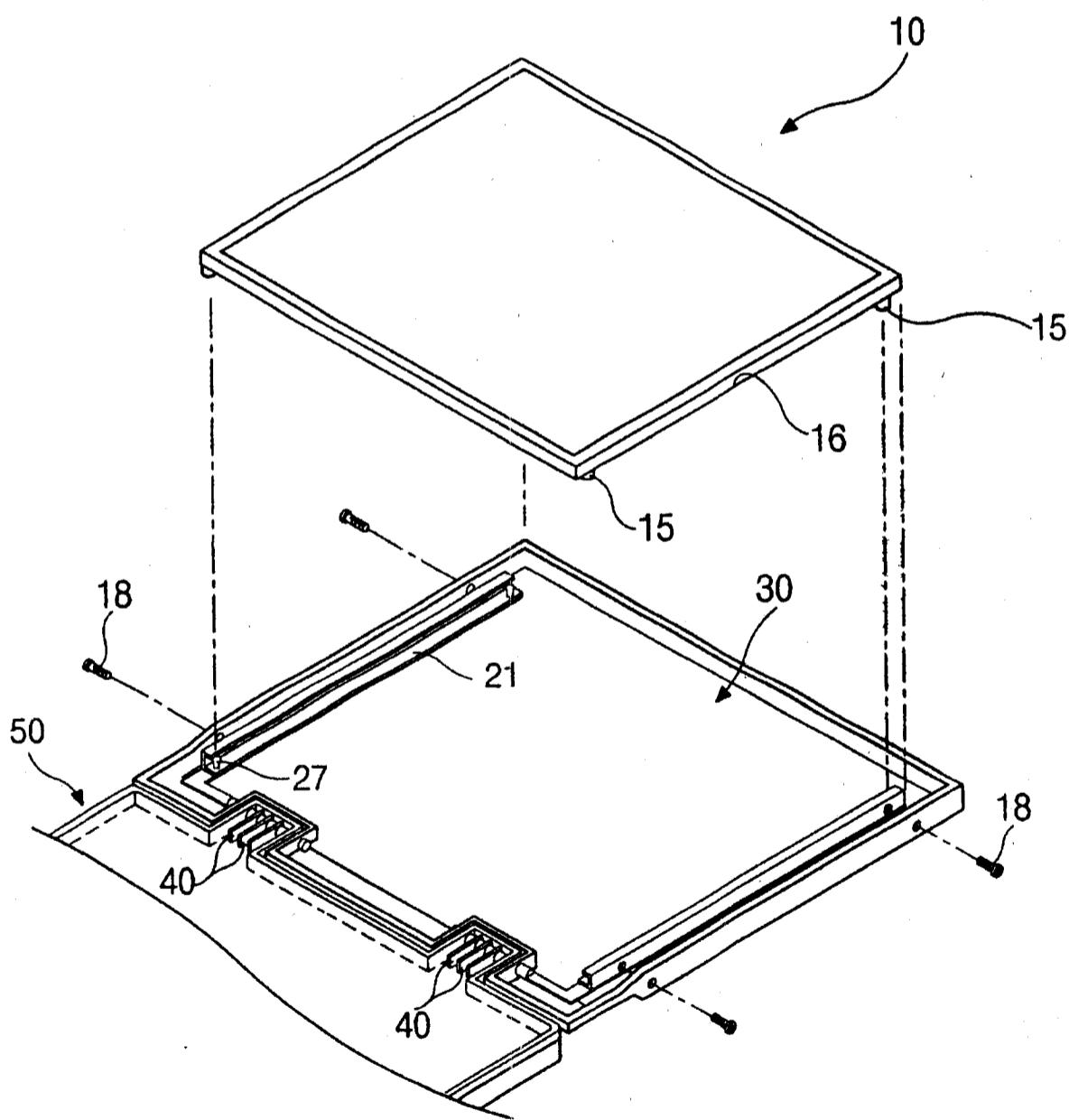
**FIG. 7**

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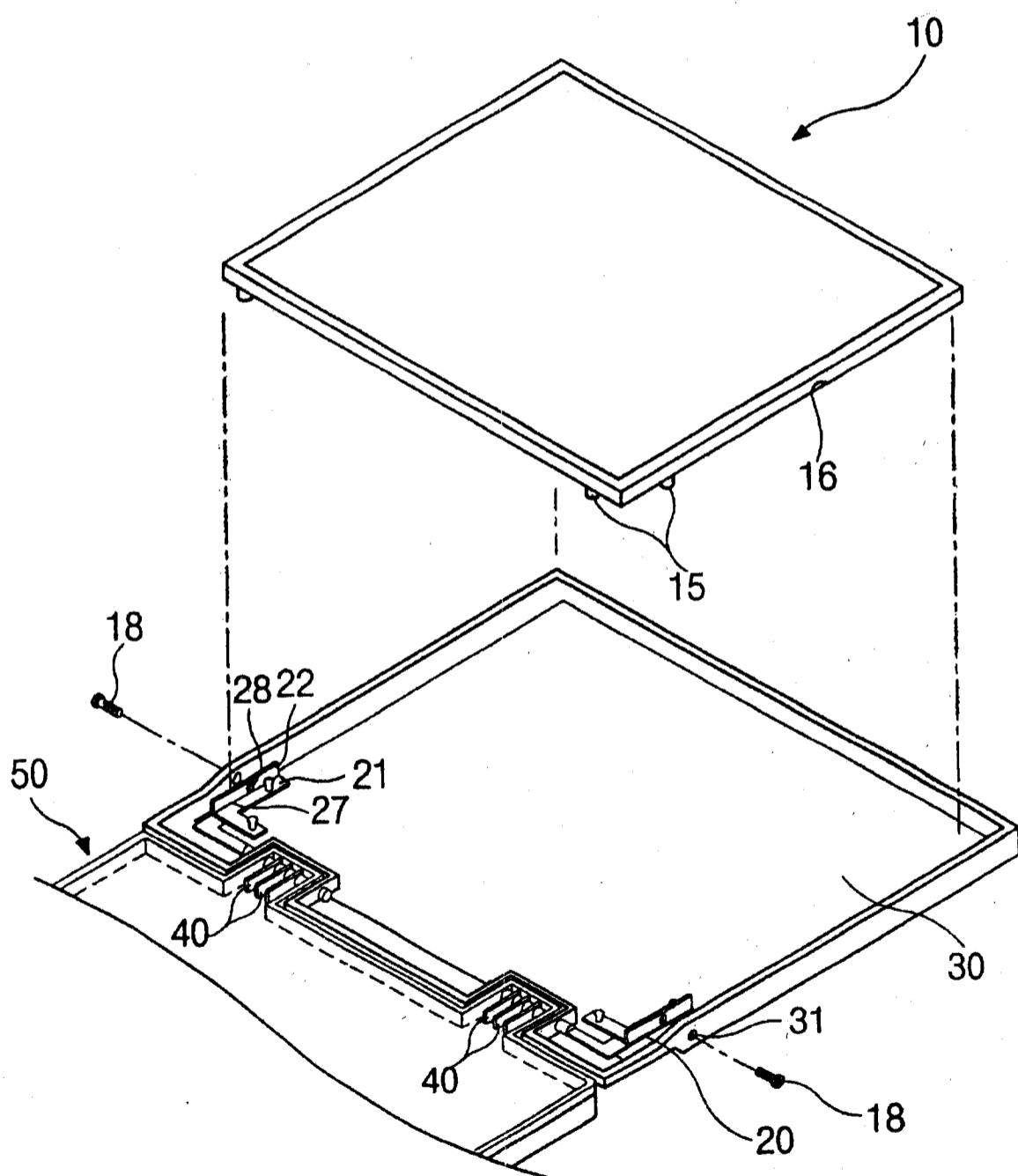
**FIG. 8**

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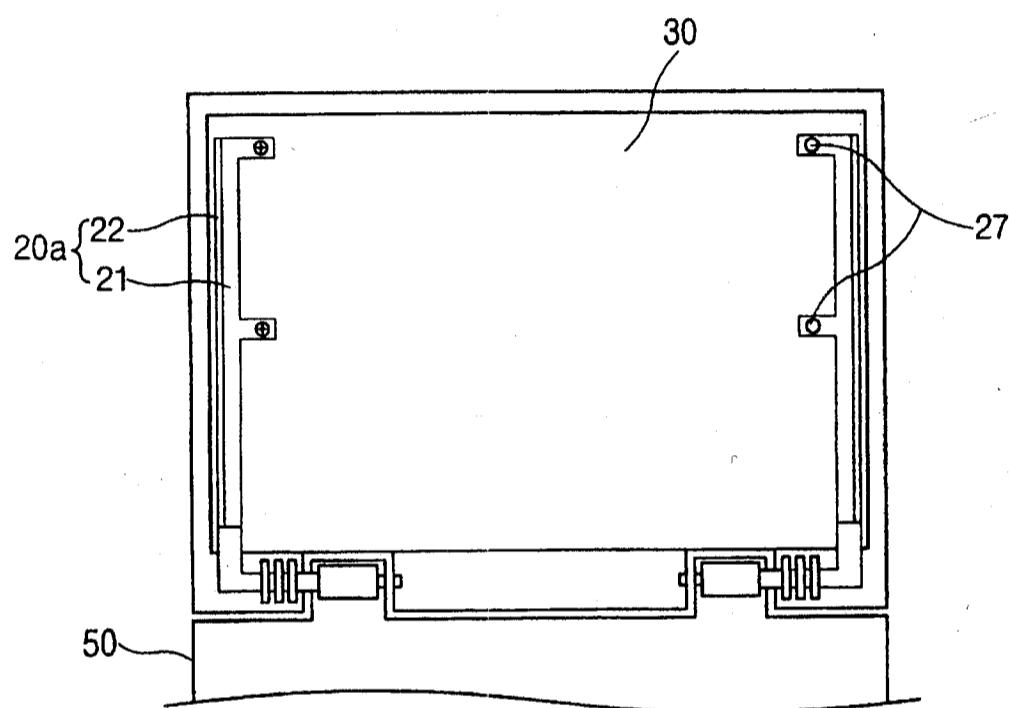
***FIG. 9***

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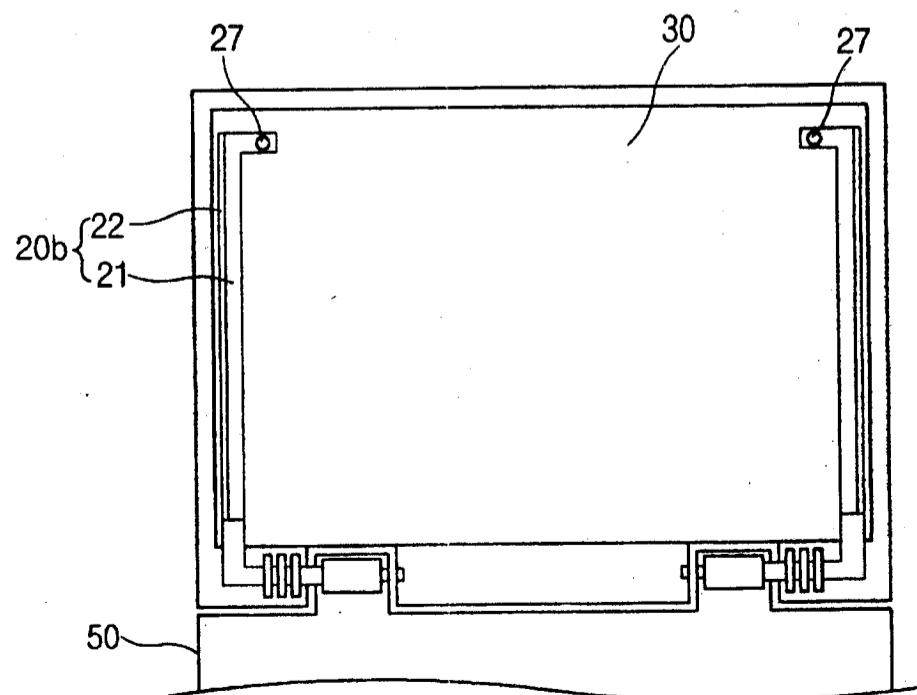
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**FIG. 10A**



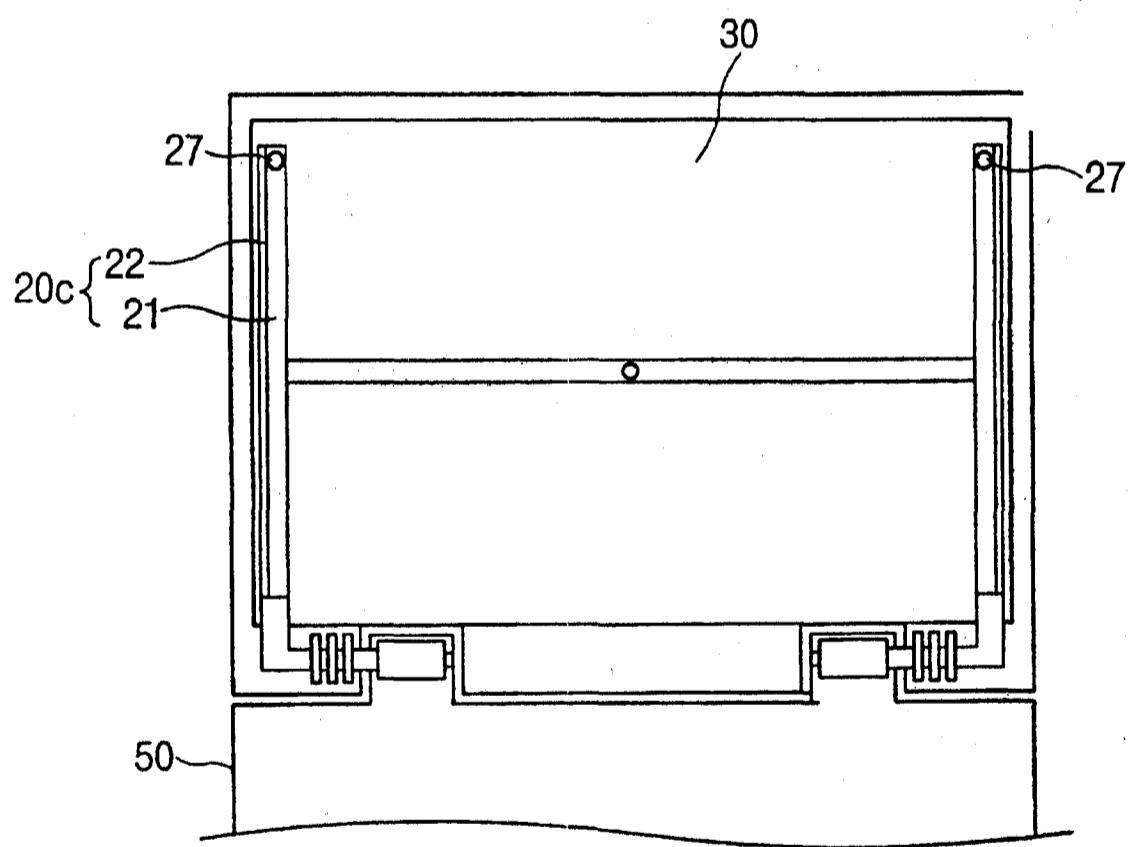
**FIG. 10B**

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***FIG. 10C***

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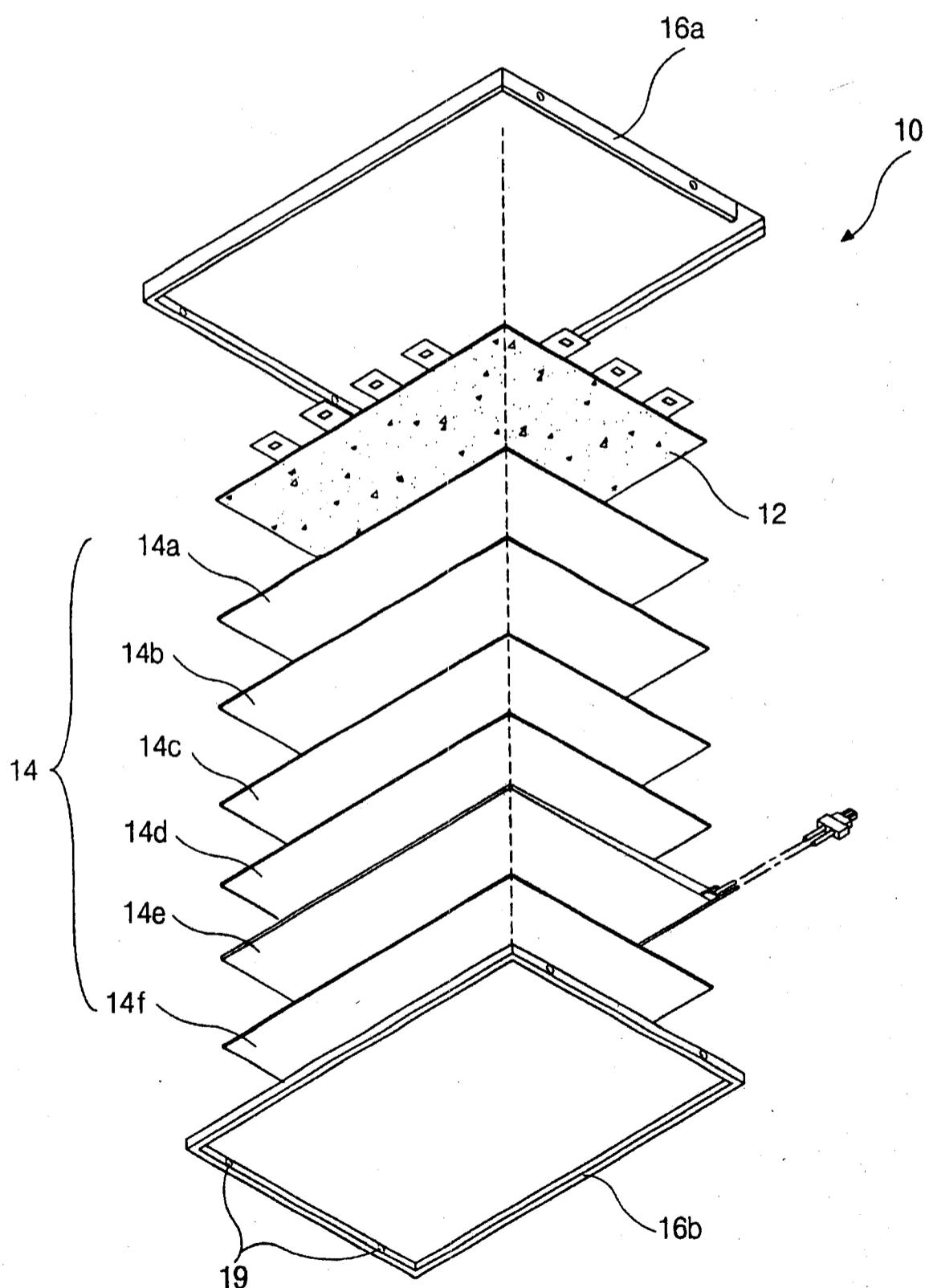


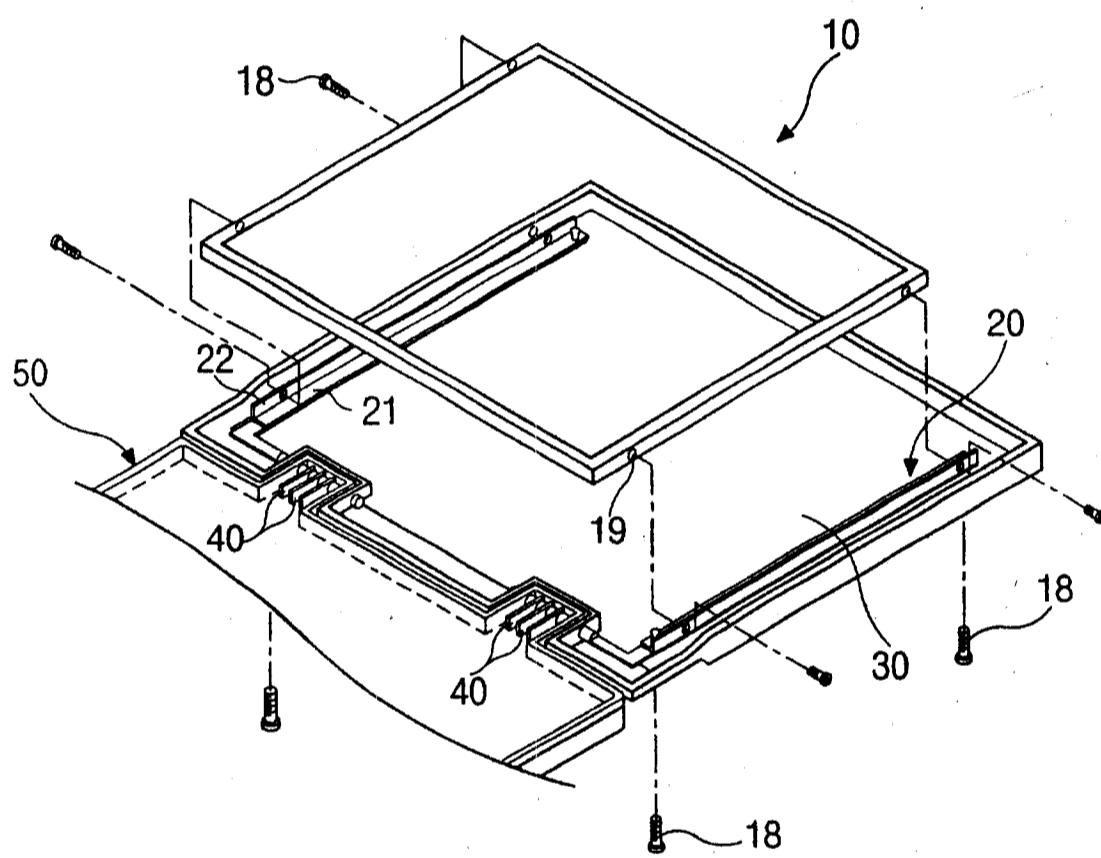
FIG. 11

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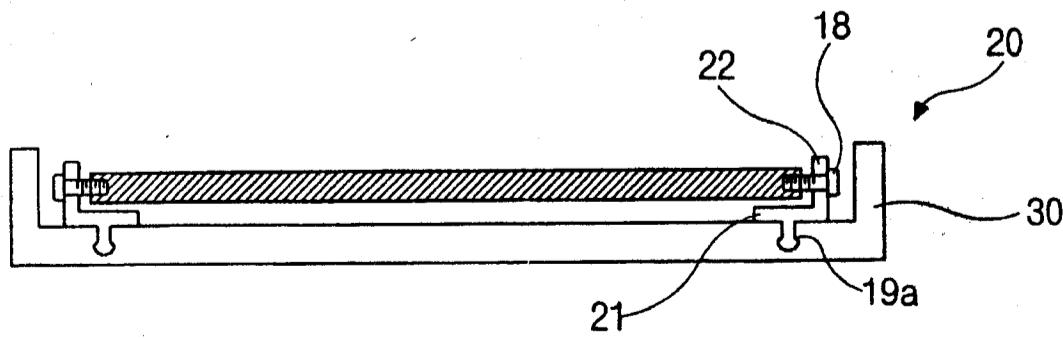
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**FIG. 12**



**FIG. 13**

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## 1

**PORTABLE COMPUTER AND METHOD FOR MOUNTING A FLAT DISPLAY DEVICE MODULE**

This application claims the benefit of Korean Patent Application No. 1998-48265, filed on Nov. 11, 1998, which is hereby incorporated by reference for all purposes as if fully set forth herein.

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The present invention relates generally to a flat panel display device, and more particularly, to a flat panel display device mounting structure on a computer.

## 2. Description of the Related Art

Flat panel display devices include liquid crystal display (LCD) devices which are used widely, plasma display panels (PDP), and field emission displays (FED) which have been studied recently and may be applied to computers in the near future.

For convenience of explanation, the present invention will be discussed with respect to the LCD as an example of a flat screen type display device and a portable computer mounted with the LCD.

Referring to FIG. 1, a general portable computer such as a laptop or notebook computer typically includes a body 100, a flat panel display device assembly 110 coupled to the body 100 via a hinge mechanism 124. The flat panel display device assembly 110 has a flat panel display module 111 and a display case 122 supporting the module 111. The body 100 has an input device 102 such as a keyboard. As a flat panel display module 111, the LCD is widely used in portable computers and flat screen monitors.

Referring to FIG. 2 which shows a conventional assembly structure of the LCD device applied to a conventional portable computer, the display case 122 has a rear case 123 and a front case or frame 121 for mounting the LCD module 130. The rear case 123 has an outer surface and an inner surface and connecting ribs 123a formed at the corners.

The LCD module 130 has an LCD panel 132, a back light device 134 fixed to the back of the LCD panel 132, and a metal sash or supporting frame 136 for assembling the panel 132 and the back light device 134 along the edge.

At the corners of the metal sash 136, corresponding to the positions of the ribs 123a of the rear case 123, a plurality of protrusions 136a having holes are formed.

For mounting the LCD module 130 to the case 122, the LCD module 130 is placed on the rear case 123 and the holes of the metal sash 136 and the ribs 123a are fastened together preferably by screws 138. The front case 121 is coupled to the rear case 123.

Hereinafter, the way in which the LCD module is mounted to the case from the front toward the rear direction is defined as the front mounting method, and the assembled structure of the LCD module and the case made through the front mounting method is defined as the front mounting structure.

In the front mounting structure of the LCD module 130, since the protrusions 136a require additional space corresponding to the protruded width "d", the ratio of the display area of the LCD module 130 to the fixed size of the case 122 is reduced.

The front mounting structure may also include an additional feature to further support the LCD panel, as shown in FIGS. 3A and 3B.

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Referring to FIGS. 3A and 3B, a conventional LCD device assembly 110 includes an LCD panel 112, a back light device (not shown) for the LCD panel 112, and a display case 122 supporting an LCD module 111. The LCD panel 112 and the back light device are assembled by a metal sash 114 along the edges together with a plastic mold frame (not shown) supporting the back light device.

The display case 122 is coupled to a body 120 via a hinge mechanism 124, which may from the body 120. The display case 122 and the hinge mechanism 124 allow the LCD device assembly 110 to pivotally move with respect to the body 120.

Two opposite sides of the metal sash 114 include flanges 114a for assembling the LCD module 111 to the display case 122, and flanges 114b for assembling the LCD module 111 to the hinge frame or hinge arm 126. Hereinafter, the former is referred as a fixing flange and the latter is referred as a mounting flange in this specification for distinction purposes. As shown in FIG. 3B, the fixing flanges 114a have a protruding width d2 and the mounting flanges 114b have a protruding width d1. A screw hole is formed in each of the flanges 114a and 114b. On the inner or bottom interior surface of the display case 122, ribs 122a are formed corresponding to the holes of the fixing flange 114a.

To mount the LCD module 111, the hinge frame 126 and the mounting flanges 114b of the metal sash 114 are screwed together, and the fixing flanges 114a of the metal sash 114 and the ribs 122a are screwed together by bolts 128.

In the mounting structure shown in FIG. 3B, the metal sash or support frame 114 requires side spaces for the flanges 114a and 114b. Therefore, the side space D (d1+d2) results in a reduction of the ratio of the display area of the LCD panel 112 relative to the display case 122. Moreover, as the display panel size increases, the display case 122 becomes undesirably large, especially for a portable computer such as a laptop computer.

To solve the above problem, an assembling structure has been suggested, as shown in FIG. 4, which is a partial perspective view. The hinge arm or frame 126, the case 122 and the side wall portion of the display module 110 are screwed together by bolts 128. However, although the embodiment shown in FIG. 4 is a good solution, there may be some instances where it is desired to attach the hinge arm, the case and the side wall portion of the display module without using a screw hole in the side wall portion of the display module or to attach hinge arm with the case (FIG. 3A).

## SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a portable computer that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

An object of the present invention is to minimize the non-display area of the LCD device.

Another object of the present invention is to provide a computer having a flat panel display device with a maximum display area and a minimal display case size.

A further object of the present invention is to provide a firm mounting structure for a flat panel display device on a computer.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advan-

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tages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and the in accordance with the purpose of the present invention, as embodied and broadly described, the present invention provides, in one aspect, a computer including: a system body having an input device; a display module having a display surface and a rear surface; a display case having a side wall surface; and a hinge pivotally coupling the body to the display module, the hinge including a hinge frame having first and second surfaces, the first surface coupled with the rear surface of the display module, the second surface coupled with the side wall surface of the display case.

In another aspect, the present invention provides a portable computer including: a system body; a display module having a display surface and a side wall surface; a display case having an inner surface; and a hinge pivotally coupling the body to the display case, the hinge including a hinge frame having first and second surfaces, the first surface coupled with the inner surface of the display case, the second surface coupled with the side wall surface of the display module.

In another aspect, the present invention provides a computer including: a system body; a display module having a display surface; a display case having side walls, the display module secured between the side walls of the display case; and a hinge pivotally coupling the body to the display case, the hinge including a hinge frame coupled to the inner surface of the display case.

The present invention according to a first embodiment provides a method for mounting a display module in a portable computer including a system body, a display case having a side wall surface, a hinge having a hinge frame having first and second surfaces, the first surface being substantially parallel to a rear surface of the display module, the second surface being substantially parallel to the side wall surface of the display case, the hinge pivotally coupling the system body to the display case, the method comprising: arranging the hinge frame so that the first surface thereof is positioned between the display case and the rear surface of the display module, and so that the second surface thereof is positioned between the display module and the side wall surface of the display case; fastening the first surface of the hinge frame to the rear surface of the display module; and fastening the second surface of the hinge frame to the side wall surface of the display case.

The present invention according to a second embodiment provides a method for mounting a display module having a side wall surface in a portable computer including a system body, a display case having inner and side wall surfaces, a hinge having a hinge frame having first and second surfaces, the first surface being substantially parallel to a rear surface of the display module, the second surface being substantially parallel to the side wall surface of the display case, the hinge pivotally coupling the system body to the display case, the method comprising: arranging the hinge frame so that the first surface thereof is positioned between the display case and the rear surface of the display module, and so that the second surface thereof is positioned between the display module and the side wall surface of the display case; fastening the first surface of the hinge frame to the inner surface of the display case; and fastening the second surface of the hinge frame to the side wall surface of the display module.

The present invention according to a second embodiment also provides a method for mounting a display module

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having a side wall surface in a portable computer including a system body, a display case having an inner and two side wall surfaces, a hinge having a hinge frame, the hinge pivotally coupling the system body to the display case, the method comprising: arranging the hinge frame so that a surface thereof is positioned between the inner surface of the display case and the rear surface of the display module; fastening the surface of the hinge frame to the inner surface of the display case; and securing the display module between the side walls of the display case.

Preferably, the display module is a liquid crystal display device (LCD) module.

Preferably, the first and second surfaces of the hinge frame are substantially perpendicular to each other.

Preferably, the first surface of the hinge frame has at least one fixing protrusion protruded toward the rear surface of the display module, and the rear surface of the display module has at least one fixing hole corresponding to the fixing protrusion of the first surface.

Preferably, the fixing protrusion is a fastener.

Preferably, the second surface of the hinge frame is screw-coupled with the side wall surface of the display case.

Preferably, the hinge frame further has a third surface for supporting an edge of the display surface of the display module, and the third surface is substantially perpendicular to the second surface.

Preferably, the fixing protrusion is a fastener.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and are intended to provide further explanation of the invention as claimed.

## BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understand of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

FIG. 1 is a perspective view showing a general portable computer;

FIG. 2 shows a structure for mounting an LCD device for a portable computer;

FIGS. 3A and 3B are a perspective view and a front view, respectively, showing a structure for mounting an LCD device for a portable computer;

FIG. 4 is a partial view showing another mounting structure of the LCD device for a conventional portable computer;

FIG. 5 is an exploded perspective view illustrating a structure for mounting a liquid crystal display module of a portable computer according to a first embodiment of the present invention;

FIG. 6 is a bottom view illustrating a rear surface of a liquid crystal display module of a portable computer according to the first embodiment of the present invention;

FIG. 7 is a partially exploded perspective view illustrating a structure for mounting a liquid crystal display module of a portable computer according to a first embodiment of the present invention;

FIG. 8 is a partially exploded perspective view illustrating a modification of a structure for mounting a liquid crystal display module of a portable computer according to a first embodiment of the present invention;

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FIG. 9 is a partially exploded perspective view illustrating another modification of a structure for mounting a liquid crystal display module of a portable computer according to a first embodiment of the present invention;

FIGS. 10A, 10B and 10C are partially exploded perspective views illustrating various modifications of a structure for mounting a liquid crystal display module of a portable computer according to a first embodiment of the present invention

FIG. 11 is an exploded perspective view illustrating a liquid crystal display module according to a second embodiment according to the invention;

FIG. 12 is a partially exploded perspective view illustrating a structure for mounting a liquid crystal display module of a portable computer according to a second embodiment of the present invention; and

FIG. 13 is a partially exploded perspective view illustrating another structure for mounting a liquid crystal display module of a portable computer according to a second embodiment of the present invention.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Reference will now be made in detail to the preferred embodiments of the present invention, an example of which is illustrated in the accompanying drawings.

Referring FIGS. 5 and 6, which show a first embodiment, a display module 10 (which may be a liquid crystal display module) has a display panel 12 and a back light device 14, both of which are assembled to each other by first and second frames 16a and 16b. The back light device 14 comprises a reflective plate 14a, a wave guide plate 14b, a first diffuser/protecting sheet 14c, a first prism sheet 14d, a second prism sheet 14e, and a second diffuser/protecting sheet 14f, which are layered in this order. The display panel 12 and the back light device 14 are supported by first and second frames 16a and 16b, and the second frame 16b has a fixing hole 15. As shown in FIG. 5, a plurality of fixing holes 15 are preferably arranged at each corner of the display module 10. The fixing holes 15 may have the shape of a rib, if necessary.

FIG. 7 is a partially exploded perspective view illustrating a structure for mounting a liquid crystal display module of a portable computer according to a first.

A hinge mount 40 is positioned at a protruded portion of a system body 50 such that a display assembly having the display module 10 and the display case 30 pivotally moves with respect to the body 50. A hinge frame 20 is positioned on an inner, or bottom interior, surface of the display case 30. The hinge frame 20 is comprised of a pin portion 20a at its one end, which is inserted into the hinge mount 40, and a "L"-shaped portion 20b which has first and second surfaces 21 and 22. The first surface 21 is parallel to a rear surface of the display module 10, and the second surface 22 is parallel to a side wall surface of the display module 10. The pin portion 20a can be coupled to the L-shaped portion 20b or be integrally formed with the L-shaped portion 20b. The hinge frame 20 also extends along the side wall surface of the display module 10. The first surface 21 has at least one fixing protrusion 27 corresponding to the fixing holes 15 of the rear surface of the display module 10, and the second surface 22 has at least one hole 28 corresponding to the through holes 31 of the side wall surface of the display case 30.

A preferred method for mounting the display module 10 according to the first embodiment is explained hereinafter.

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The fixing protrusion 27 of the second surface 22 of the L-shaped portion 20b of the hinge frame 20 is inserted into the fixing holes 15 of the display module 10 such that the display module 10 is secured. Then a coupling member 18 such as a screw and a nail passes through the hole 28 of the second surface 22 and the through hole 31 of the display case 30 such that the hinge frame 20 is fixed to the display case 30.

Also, the fixing protrusion 27 preferably has the shape of a plastic hook or a fastener for firmly holding the display module 10, and an inlet portion of the fixing hole 15 is preferably narrower than an interior portion of the fixing hole 15.

To provide a more shockproof and shake-proof mounting structure, the hinge frame 20 can have the shape of "C" as shown in FIG. 8. That is, the hinge frame 20 further has a third surface 23 to support both upper edges of opposing sides of the display module 10 parallel to the hinge frame 20. The first and third surfaces 21 and 23 can be integrally formed with the second surface 22, or can be attachable brackets.

FIG. 9 shows another modification of the first embodiment.

The hinge frame 20 can have a reverse "F" shaped first surface 21 to hold the display module 10, instead of a long elongated first surface 21 (see FIG. 7).

FIGS. 10A, 10B and 10C are other modifications of a mounting structure according to the first embodiment.

The hinge frames 20a, 20b and 20c may have various shapes of first surfaces 21 to enhance a fixing force of a display module 10.

FIG. 11 illustrates a second embodiment, wherein the structure of the display module 10 is similar to that shown in FIG. 5, and therefore, the explanation thereof is not repeated here. However, the display module 10 has a plurality of fixing holes 19 on the side wall surface thereof other than the rear surface thereof. The fixing holes 19 are for a side mounting method wherein the side wall of the display module 10 is coupled to a hinge frame or to the case. That is, the display module 10 can be assembled to the hinge frame 20 (see FIG. 7) not to the case 30 (see FIG. 7). It is also possible that the display module 10 is assembled to the case 30 directly, without engaging the hinge frame 20 therebetween.

FIG. 12 shows an exemplary mounting structure wherein the hinge frame is assembled to the inner, or bottom interior, surface of the case 30 and the display module 10 is mounted inside of the case 30. Preferably, the hinge frame 20 has an "L" shape and has a first surface 21 contacting with the rear surface of display module 10 and a second surface 22 contacting with the side wall surface of the display module 10. The display case 30 has a plurality of screw holes (not shown) on the inner surface thereof, and the first surface 21 of the hinge frame 20 has a plurality of screw holes 25 corresponding to the screw holes of the display case 30. Further, the second surface 21 of the hinge frame 20 preferably has a plurality of screw holes 26 corresponding to the screw holes 19 of the side wall surface of the display module 10. Thus, the first surface 21 of the hinge frame 20 is coupled with the display case 30, and the second surface 22 of the hinge frame 20 is coupled with the display module 10.

FIG. 13 shows another exemplary mounting structure of the second embodiment. The structure of FIG. 13 also shows a mounting structure wherein the hinge frame 20 is assembled to the inner surface of the case 30.

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The first surface 21 of the hinge frame 20 has a plurality of plastic hooks or fasteners protruded toward the inner surface of the case 30, and the display case 30 has a plurality of fastener fixing holes 19a corresponding to the fastener, thereby the first surface 21 of the hinge frame 20 is coupled with the display case 30 by pressing the first surface 21 without tightening a screw.

In the second embodiment, instead of a screw and fastener, a nail can be employed. Further, the hinge frame may be "C" shaped, and a bracket having a long length may be used instead of the hinge frame integrally formed with the pin portion. The hinge frame may have a short length.

As described until here, using the mounting structure according to the invention, the display area is maximized, and a more shock-proof display assembly is provided. Further, the mounting structure according to one embodiment of the invention has an advantage that the display assembly can be assembled to the case without tightening a screw into the side wall surface of the display module. The invention also shows that the hinge frame of the invention can be assembled to a rear surface of the display module or to an inner surface of the case.

Other embodiments of the invention will be apparent to the skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with the true scope and spirit of the invention being indicated by the following claims.

What is claimed is:

1. A portable computer, comprising:  
a system body having an input device;  
a display module having a display surface and a rear surface;  
a display case having a side wall surface; and  
a hinge pivotally coupling the system body to the display module, the hinge including a hinge frame having first and second surfaces, the first surface coupled with the rear surface of the display module, the second surface coupled with the side wall surface of the display case.
2. The computer of claim 1, wherein the display module is a liquid crystal display (LCD) module.
3. The computer of claim 2, wherein the first and second surfaces of the hinge frame are substantially perpendicular to each other.
4. The computer of claim 2, wherein the first surface of the hinge frame has at least one fixing protrusion protruded toward the rear surface of the display module, and the rear surface of the display module has at least one fixing hole corresponding to the fixing protrusion of the first surface.
5. The computer of claim 4, wherein the fixing protrusion is a fastener.
6. The computer of claim 4, wherein the second surface of the hinge frame is screw-coupled with the side wall surface of the display case.
7. The computer of claim 2, wherein the hinge frame further has a third surface for supporting an edge of the display surface of the display module, and the third surface is substantially perpendicular to the second surface.
8. A portable computer, comprising:  
a system body;  
a display module having a display surface and a side wall surface;  
a display case having an inner surface; and  
a hinge pivotally coupling the system body to the display case, the hinge including a hinge frame having first and

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second surfaces, the first surface coupled with the inner surface of the display case, the second surface coupled with the side wall surface of the display module.

9. The computer of claim 8, wherein the display module is a liquid crystal display (LCD) module.
10. The computer of claim 9, wherein the first surface of the hinge frame is screw-coupled with the inner surface of the display case, and the second surface of the hinge frame is screw-coupled with the side wall surface of the display module.
11. The computer of claim 9, wherein the first surface of the hinge frame has at least one fixing protrusion protruded toward the inner surface of the display case, and the inner surface has at least one fixing hole corresponding to the fixing protrusion of the first surface.
12. The computer of claim 11, wherein the fixing protrusion is a fastener.
13. A computer, comprising:  
a system body;  
a display module having a display surface;  
a display case having side walls, the display module secured between the side walls of the display case; and  
a hinge pivotally coupling the body to the display case, the hinge including a hinge frame coupled to the inner surface of the display case.
14. The computer of claim 13, wherein the display module is a liquid crystal display (LCD) module.
15. The computer of claim 14, wherein the hinge frame is screw-coupled with the inner surface of the display case.
16. The computer of claim 14, wherein the hinge frame has at least one fixing protrusion protruded toward the inner surface of the display case, and the inner surface has at least one fixing hole corresponding to the fixing protrusion of the hinge frame.
17. The computer of claim 16, wherein the fixing protrusion is a fastener.
18. A method for mounting a display module in a portable computer including a system body, a display case having a side wall surface, a hinge having a hinge frame having first and second surfaces, the first surface being substantially parallel to a rear surface of the display module, the second surface being substantially parallel to the side wall surface of the display case, the hinge pivotally coupling the system body to the display case, the method comprising:  
arranging the hinge frame so that the first surface thereof is positioned between the display case and the rear surface of the display module, and so that the second surface thereof is positioned between the display module and the side wall surface of the display case;  
fastening the first surface of the hinge frame to the rear surface of the display module; and  
fastening the second surface of the hinge frame to the side wall surface of the display case.
19. The method of claim 18, wherein the display module is a liquid crystal display (LCD) module.
20. The method of claim 18, wherein the first surface of the hinge frame has at least one fixing protrusion protruded toward the rear surface of the display module, and the rear surface of the display module has at least one fixing hole corresponding to the fixing protrusion of the first surface of the hinge frame.
21. The method of claim 18, wherein the first surface of the hinge frame is screw-coupled with the rear surface of the display module.
22. The method of claim 18, wherein the second surface of the hinge frame is screw-coupled with the side wall surface of the display case.

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**23.** A method for mounting a display module having a side wall surface in a portable computer including a system body, a display case having inner and side wall surfaces, a hinge having a hinge frame having first and second surfaces, the first surface being substantially parallel to a rear surface of the display module, the second surface being substantially parallel to the side wall surface of the display case, the hinge pivotally coupling the system body to the display case, the method comprising:

arranging the hinge frame so that the first surface thereof is positioned between the display case and the rear surface of the display module, and so that the second surface thereof is positioned between the display module and the side wall surface of the display case;

fastening the first surface of the hinge frame to the inner surface of the display case; and

fastening the second surface of the hinge frame to the side wall surface of the display module.

**24.** The method of claim 23, wherein the display module is a liquid crystal display (LCD) module.

**25.** The method of claim 23, wherein the first surface of the hinge frame is screw-coupled with the inner surface of the display case.

**26.** The method of claim 23, wherein the second surface of the hinge frame is screw-coupled with the side wall surface of the display module.

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**27.** The method of claim 23, wherein the first surface of the hinge frame is coupled to the inner surface of the display case by a fastener.

**28.** A method for mounting a display module having a side wall surface in a portable computer including a system body, a display case having an inner and two side wall surfaces, a hinge having a hinge frame, the hinge pivotally coupling the system body to the display case, the method comprising:

15 arranging the hinge frame so that a surface thereof is positioned between the inner surface of the display case and the rear surface of the display module;

fastening the surface of the hinge frame to the inner surface of the display case; and

securing the display module between the side walls of the display case.

**29.** The method of claim 28, wherein the display module is a liquid crystal display (LCD) module.

**30.** The method of claim 28, wherein the surface of the hinge frame is screw-coupled with the inner surface of the display case.

**31.** The method of claim 28, wherein the surface of the hinge frame is coupled to the inner surface of the display case by a fastener.

\* \* \* \* \*

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## **U.S. UTILITY PATENT APPLICATION**

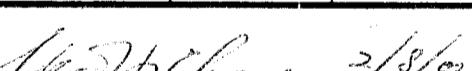
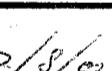
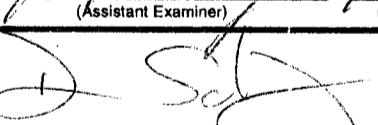
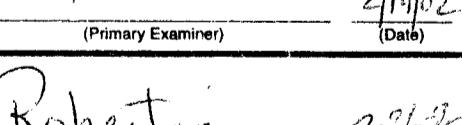
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<b>SCANNED</b> 	<b>JUN 25 2002</b>
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SECTOR	CLASS	SUBCLASS	ART UNIT	EXAMINER

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**PREPARED AND APPROVED FOR ISSUE**

## **ISSUING CLASSIFICATION**

<input type="checkbox"/> TERMINAL DISCLAIMER	DRAWINGS			CLAIMS ALLOWED	
	Sheets Drwg.	Figs. Drwg.	Print Fig.	Total Claims	Print Claim for O.G.
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<input type="checkbox"/> a) The term of this patent subsequent to _____ (date) has been disclaimed.	 (Assistant Examiner)  (Date)			NOTICE OF ALLOWANCE MAILED	
<input type="checkbox"/> b) The term of this patent shall not extend beyond the expiration date of U.S Patent. No. _____	 DARREN SCHUBERG PRIMARY EXAMINER Supervisory Patent (Primary Examiner)  (Date)			2 - 22 - 02	
<input type="checkbox"/> c) The terminal _____ months of this patent have been disclaimed.	 Robertson 2/26/02			ISSUE FEE	
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## PATENT APPLICATION



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INITIALS \_\_\_\_\_

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5. <u>Priority</u>	<u>3/3/00</u>
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**SEARCHED**

Class	Sub.	Date	Exmr.
361	679-683	5/16-17/01	llc
292	8,56,32, 94,11	5/16-17/01	llc
244	917-923	5/17/01	llc
349	58,59,60	5/17/01	llc
14	342,307	5/16/01	llc
updated search see above		10/18/01	llc

updated  
2/8/02 y/lcc

**SEARCH NOTES  
(INCLUDING SEARCH STRATEGY)**

Text search.  
portable adj' computer  
display adj' module  
display adj' case  
hinge

2/8/02 y/lcc

**INTERFERENCE SEARCHED**

Class	Sub.	Date	Exmr.
361	681		
	683		
<del>361</del> 349	58	2/8/02	y/lcc

POSITION	INITIALS	ID NO.	DATE
FEE DETERMINATION	(Map)		12/22/01
O.I.P.E. CLASSIFIER			12/22/01
FORMALITY REVIEW	DM	72223	12/8/99 3/8/02

## INDEX OF CLAIMS

✓ ..... Rejected  
 = ..... Allowed  
 - (Through numeral)... Canceled  
 + ..... Restricted

N ..... Non-elected  
 I ..... Interference  
 A ..... Appeal  
 O ..... Objected

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2	2	2	12/22/01
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Fee Record Sheet

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03 FC:102	234.00	OP
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ABSTRACT OF THE DISCLOSURE

Disclosed is a computer that includes: a system body having an input device; a display module having a display surface and a rear surface; a display case having a side wall surface; and a hinge pivotally coupling the body to the display module, the hinge including a hinge frame having first and second surfaces, the first surface coupled with the rear surface of the display module, the second surface coupled with the side wall surface of the display case.

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**U. S. PATENT APPLICATION**

**OF**

**YOUNG WOO CHO**

**JONG WHAN KIM**

**DAE HEE PARK**

**FOR**

**PORTABLE COMPUTER AND**

**METHOD FOR MOUNTING A FLAT PANEL DISPLAY DEVICE MODULE**

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This application claims the benefit of Korean Patent Application No. 1998-48265, filed on November 11, 1998, which is hereby incorporated by reference for all purposes as if fully set forth herein.

#### **BACKGROUND OF THE INVENTION**

##### **5 Field of the Invention**

The present invention relates generally to a flat panel display device, and more particularly, to a flat panel display device mounting structure on a computer.

##### **Description of the Related Art**

10 Flat panel display devices include liquid crystal display (LCD) devices which are used widely, plasma display panels (PDP), and field emission displays (FED) which have been studied recently and may be applied to computers in the near future.

15 For convenience of explanation, the present invention will be discussed with respect to the LCD as an example of a flat screen type display device and a portable computer mounted with the LCD.

Referring to Fig. 1, a general portable computer such as a laptop or notebook computer typically includes a body 100, a flat panel display device assembly 110 coupled to the body 100 via a hinge mechanism 124. The flat panel display device assembly 110 has a flat panel display module 111 and a display case 122 supporting the module 111. The body 100 has an input device 102 such as a keyboard. As a flat panel display module 111, the LCD is widely used in portable computers and flat screen monitors.

Referring to Fig. 2 which shows a conventional assembly structure of the LCD device applied to a conventional portable computer, the display case 122 has a rear case 123 and a front case or frame 121 for mounting the LCD module 130. The rear case 123 has an outer

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surface and an inner surface and connecting ribs 123a formed at the corners.

The LCD module 130 has an LCD panel 132, a back light device 134 fixed to the back of the LCD panel 132, and a metal sash or supporting frame 136 for assembling the panel 132 and the back light device 134 along the edge.

5 At the corners of the metal sash 136, corresponding to the positions of the ribs 123a of the rear case 123, a plurality of protrusions 136a having holes are formed.

For mounting the LCD module 130 to the case 122, the LCD module 130 is placed on the rear case 123 and the holes of the metal sash 136 and the ribs 123a are fastened together preferably by screws 138. The front case 121 is coupled to the rear case 123.

10 Hereinafter, the way in which the LCD module is mounted to the case from the front toward the rear direction is defined as the front mounting method, and the assembled structure of the LCD module and the case made through the front mounting method is defined as the front mounting structure.

In the front mounting structure of the LCD module 130, since the protrusions 136a require additional space corresponding to the protruded width "d", the ratio of the display area of the LCD module 130 to the fixed size of the case 122 is reduced.

The front mounting structure may also include an additional feature to further support the LCD panel, as shown in Figs. 3A and 3B.

Referring to Figs. 3A and 3B, a conventional LCD device assembly 110 includes an LCD panel 112, a back light device (not shown) for the LCD panel 112, and a display case 122 supporting an LCD module 111. The LCD panel 112 and the back light device are assembled by a metal sash 114 along the edges together with a plastic mold frame (not shown) supporting the back light device.

The display case 122 is coupled to a body 120 via a hinge mechanism 124, which may

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extend from the body 120. The display case 122 and the hinge mechanism 124 allow the LCD device assembly 110 to pivotally move with respect to the body 120.

Two opposite sides of the metal sash 114 include flanges 114a for assembling the LCD module 111 to the display case 122, and flanges 114b for assembling the LCD module 111 to the hinge frame or hinge arm 126. Hereinafter, the former is referred as a fixing flange and the latter is referred as a mounting flange in this specification for distinction purposes. As shown in Fig. 3B, the fixing flanges 114a have a protruding width  $d_2$  and the mounting flanges 114b have a protruding width  $d_1$ . A screw hole is formed in each of the flanges 114a and 114b. On the inner or bottom interior surface of the display case 122, ribs 122a are formed corresponding to the holes of the fixing flange 114a.

To mount the LCD module 111, the hinge frame 126 and the mounting flanges 114b of the metal sash 114 are screwed together, and the fixing flanges 114a of the metal sash 114 and the ribs 122a are screwed together by bolts 128.

In the mounting structure shown in Fig. 3B, the metal sash or support frame 114 requires side spaces for the flanges 114a and 114b. Therefore, the side space D ( $d_1 + d_2$ ) results in a reduction of the ratio of the display area of the LCD panel 112 relative to the display case 122. Moreover, as the display panel size increases, the display case 122 becomes undesirably large, especially for a portable computer such as a laptop computer.

To solve the above problem, an assembling structure has been suggested, as shown in Fig. 4, which is a partial perspective view. The hinge arm or frame 126, the case 122 and the side wall portion of the display module 110 are screwed together by bolts 128. However, although the embodiment shown in Fig. 4 is a good solution, there may be some instances where it is desired to attach the hinge arm, the case and the side wall portion of the display module without using a screw hole in the side wall portion of the display module or to attach

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the hinge arm with the case (Fig. 3A).

### SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a portable computer that substantially 5 obviates one or more of the problems due to limitations and disadvantages of the related art.

An object of the present invention is to minimize the non-display area of the LCD device.

Another object of the present invention is to provide a computer having a flat panel display device with a maximum display area and a minimal display case size.

10 A further object of the present invention is to provide a firm mounting structure for a flat panel display device on a computer.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be 15 realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and the in accordance with the purpose of the present invention, as embodied and broadly described, the present invention provides, in one aspect, a computer including: a system body having an input device; a display module having 20 a display surface and a rear surface; a display case having a side wall surface; and a hinge pivotally coupling the body to the display module, the hinge including a hinge frame having first and second surfaces, the first surface coupled with the rear surface of the display module, the second surface coupled with the side wall surface of the display case.

In another aspect, the present invention provides a portable computer including: a

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system body; a display module having a display surface and a side wall surface; a display case having an inner surface; and a hinge pivotally coupling the body to the display case, the hinge including a hinge frame having first and second surfaces, the first surface coupled with the inner surface of the display case, the second surface coupled with the side wall surface of the display module.

In another aspect, the present invention provides a computer including: a system body; a display module having a display surface; a display case having side walls, the display module secured between the side walls of the display case; and a hinge pivotally coupling the body to the display case, the hinge including a hinge frame coupled to the inner surface of the display case.

The present invention according to a first embodiment provides a method for mounting a display module in a portable computer including a system body, a display case having a side wall surface, a hinge having a hinge frame having first and second surfaces, the first surface being substantially parallel to a rear surface of the display module, the second surface being substantially parallel to the side wall surface of the display case, the hinge pivotally coupling the system body to the display case, the method comprising: arranging the hinge frame so that the first surface thereof is positioned between the display case and the rear surface of the display module, and so that the second surface thereof is positioned between the display module and the side wall surface of the display case; fastening the first surface of the hinge frame to the rear surface of the display module; and fastening the second surface of the hinge frame to the side wall surface of the display case.

The present invention according to a second embodiment provides a method for mounting a display module having a side wall surface in a portable computer including a system body, a display case having inner and side wall surfaces, a hinge having a hinge frame

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having first and second surfaces, the first surface being substantially parallel to a rear surface of the display module, the second surface being substantially parallel to the side wall surface of the display case, the hinge pivotally coupling the system body to the display case, the method comprising: arranging the hinge frame so that the first surface thereof is positioned 5 between the display case and the rear surface of the display module, and so that the second surface thereof is positioned between the display module and the side wall surface of the display case; fastening the first surface of the hinge frame to the inner surface of the display case; and fastening the second surface of the hinge frame to the side wall surface of the display module.

10 The present invention according to a second embodiment also provides a method for mounting a display module having a side wall surface in a portable computer including a system body, a display case having an inner and two side wall surfaces, a hinge having a hinge frame, the hinge pivotally coupling the system body to the display case, the method comprising: arranging the hinge frame so that a surface thereof is positioned between the 15 inner surface of the display case and the rear surface of the display module; fastening the surface of the hinge frame to the inner surface of the display case; and securing the display module between the side walls of the display case.

Preferably, the display module is a liquid crystal display device (LCD) module.

20 Preferably, the first and second surfaces of the hinge frame are substantially perpendicular to each other.

Preferably, the first surface of the hinge frame has at least one fixing protrusion protruded toward the rear surface of the display module, and the rear surface of the display module has at least one fixing hole corresponding to the fixing protrusion of the first surface.

Preferably, the fixing protrusion is a fastener.

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Preferably, the second surface of the hinge frame is screw-coupled with the side wall surface of the display case.

Preferably, the hinge frame further has a third surface for supporting an edge of the display surface of the display module, and the third surface is substantially perpendicular to 5 the second surface.

Preferably, the fixing protrusion is a fastener.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and are intended to provide further explanation of the invention as claimed.

10

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The accompanying drawings, which are included to provide a further understand of the invention and are incorporated in and constitute a part of this specification, illustrate 15 embodiments of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

Fig. 1 is a perspective view showing a general portable computer;

Fig. 2 shows a structure for mounting an LCD device for a portable computer;

Figs. 3A and 3B are a perspective view and a front view, respectively, showing a 20 structure for mounting an LCD device for a portable computer;

Fig. 4 is a partial view showing another mounting structure of the LCD device for a conventional portable computer;

Fig. 5 is an exploded perspective view illustrating a structure for mounting a liquid

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crystal display module of a portable computer according to a first embodiment of the present invention;

Fig. 6 is a bottom view illustrating a rear surface of a liquid crystal display module of a portable computer according to the first embodiment of the present invention;

5 Fig. 7 is a partially exploded perspective view illustrating a structure for mounting a liquid crystal display module of a portable computer according to a first embodiment of the present invention;

10 Fig. 8 is a partially exploded perspective view illustrating a modification of a structure for mounting a liquid crystal display module of a portable computer according to a first embodiment of the present invention;

Fig. 9 is a partially exploded perspective view illustrating another modification of a structure for mounting a liquid crystal display module of a portable computer according to a first embodiment of the present invention;

15 Figs. 10A, 10B and 10C are partially exploded perspective views illustrating various modifications of a structure for mounting a liquid crystal display module of a portable computer according to a first embodiment of the present invention

Fig. 11 is an exploded perspective view illustrating a liquid crystal display module according to a second embodiment according to the invention;

20 Fig. 12 is a partially exploded perspective view illustrating a structure for mounting a liquid crystal display module of a portable computer according to a second embodiment of the present invention; and

Fig. 13 is a partially exploded perspective view illustrating another structure for mounting a liquid crystal display module of a portable computer according to a second embodiment of the present invention.

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-- PATENT --**DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS**

Reference will now be made in detail to the preferred embodiments of the present invention, an example of which is illustrated in the accompanying drawings.

5 Referring Figs. 5 and 6, which show a first embodiment, a display module 10 (which may be a liquid crystal display module) has a display panel 12 and a back light device 14, both of which are assembled to each other by first and second frames 16a and 16b. The back light device 14 comprises a reflective plate 14a, a wave guide plate 14b, a first diffuser/protecting sheet 14c, a first prism sheet 14d, a second prism sheet 14e, and a second diffuser/protecting sheet 14f, which are layered in this order. The display panel 12 and the back light device 14 are supported by first and second frames 16a and 16b, and the second frame 16b has a fixing hole 15. As shown in Fig. 5, a plurality of fixing holes 15 are 10 preferably arranged at each corner of the display module 10. The fixing holes 15 may have the shape of a rib, if necessary.

15 Fig. 7 is a partially exploded perspective view illustrating structure for mounting a liquid crystal display module of a portable computer according to a first.

A hinge mount 40 is positioned at a protruded portion of a system body 50 such that a display assembly having the display module 10 and the display case 30 pivotally moves with respect to the body 50. A hinge frame 20 is positioned on an inner, or bottom interior, surface 20 of the display case 30. The hinge frame 20 is comprised of a pin portion 20a at its one end, which is inserted into the hinge mount 40, and a "L"-shaped portion 20b which has first and second surfaces 21 and 22. The first surface 21 is parallel to a rear surface of the display module 10, and the second surface 22 is parallel to a side wall surface of the display module 20.

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10. The pin portion 20a can be coupled to the L-shaped portion 20b or be integrally formed with the L-shaped portion 20b. The hinge frame 20 also extends along the side wall surface of the display module 10. The first surface 21 has at least one fixing protrusion 27 corresponding to the fixing holes 15 of the rear surface of the display module 10, and the 5 second surface 22 has at least one hole 28 corresponding to the through holes 31 of the side wall surface of the display case 30.

A preferred method for mounting the display module 10 according to the first embodiment is explained hereinafter. The fixing protrusion 27 of the second surface 22 of the L-shaped portion 20b of the hinge frame 20 is inserted into the fixing holes 15 of the display 10 module 10 such that the display module 10 is secured. Then a coupling member 18 such as a screw and a nail passes through the hole 28 of the second surface 22 and the through hole 31 of the display case 30 such that the hinge frame 20 is fixed to the display case 30.

15 Also, the fixing protrusion 27 preferably has the shape of a plastic hook or a fastener for firmly holding the display module 10, and an inlet portion of the fixing hole 15 is preferably narrower than an interior portion of the fixing hole 15.

To provide a more shockproof and shake-proof mounting structure, the hinge frame 20 can have the shape of "C" as shown in Fig. 8. That is, the hinge frame 20 further has a third surface 23 to support both upper edges of opposing sides of the display module 10 parallel to the hinge frame 20. The first and third surfaces 21 and 23 can be integrally formed 20 with the second surface 22, or can be attachable brackets.

Fig. 9 shows another modification of the first embodiment.

The hinge frame 20 can have a reverse "F" shaped first surface 21 to hold the display module 10, instead of a long elongated first surface 21 (see Fig. 7).

Figs. 10A, 10B and 10C are other modifications of a mounting structure according to

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the first embodiment.

The hinge frames 20a, 20b and 20c may have various shapes of first surfaces 21 to enhance a fixing force of a display module 10.

Fig. 11 illustrates a second embodiment, wherein the structure of the display module 10 is similar to that shown in Fig. 5, and therefore, the explanation thereof is not repeated here. However, the display module 10 has a plurality of fixing holes 19 on the side wall surface thereof other than the rear surface thereof. The fixing holes 19 are for a side mounting method wherein the side wall of the display module 10 is coupled to a hinge frame or to the case. That is, the display module 10 can be assembled to the hinge frame 20 (see Fig. 7) not to the case 30 (see Fig. 7). It is also possible that the display module 10 is assembled to the case 30 directly, without engaging the hinge frame 20 therebetween.

Fig. 12 shows an exemplary mounting structure wherein the hinge frame is assembled to the inner, or bottom interior, surface of the case 30 and the display module 10 is mounted inside of the case 30. Preferably, the hinge frame 20 has an "L" shape and has a first surface 21 contacting with the rear surface of display module 10 and a second surface 22 contacting with the side wall surface of the display module 10. The display case 30 has a plurality of screw holes (not shown) on the inner surface thereof, and the first surface 21 of the hinge frame 20 has a plurality of screw holes 25 corresponding to the screw holes of the display case 30. Further, the second surface 21 of the hinge frame 20 preferably has a plurality of screw holes 26 corresponding to the screw holes 19 of the side wall surface of the display module 10. Thus, the first surface 21 of the hinge frame 20 is coupled with the display case 30, and the second surface 22 of the hinge frame 20 is coupled with the display module 10.

Fig. 13 shows another exemplary mounting structure of the second embodiment. The structure of Fig. 13 also shows a mounting structure wherein the hinge frame 20 is assembled

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to the inner surface of the case 30.

The first surface 21 of the hinge frame 20 has a plurality of plastic hooks or fasteners protruded toward the inner surface of the case 30, and the display case 30 has a plurality of fastener fixing holes 19a corresponding to the fastener, thereby the first surface 21 of the 5 hinge frame 20 is coupled with the display case 30 by pressing the first surface 21 without tightening a screw.

In the second embodiment, instead of a screw and fastener, a nail can be employed.

Further, the hinge frame may be "C" shaped, and a bracket having a long length may be used instead of the hinge frame integrally formed with the pin portion. The hinge frame may have 10 a short length.

As described until here, using the mounting structure according to the invention, the display area is maximized, and a more shock-proof display assembly is provided. Further, the mounting structure according to one embodiment of the invention has an advantage that the display assembly can be assembled to the case without tightening a screw into the side wall 15 surface of the display module. The invention also shows that the hinge frame of the invention can be assembled to a rear surface of the display module or to an inner surface of the case.

Other embodiments of the invention will be apparent to the skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with the true scope and 20 spirit of the invention being indicated by the following claims.

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**WHAT IS CLAIMED IS:**

- 1 1. A portable computer, comprising:
  - 2 a system body having an input device;
  - 3 a display module having a display surface and a rear surface;
  - 4 a display case having a side wall surface; and
  - 5 a hinge pivotally coupling the system body to the display module, the hinge including
  - 6 a hinge frame having first and second surfaces, the first surface coupled with the rear surface
  - 7 of the display module, the second surface coupled with the side wall surface of the display
  - 8 case.
- 1 2. The computer of claim 1, wherein the display module is a liquid crystal display (LCD)
- 2 module.
- 1 3. The computer of claim 2, wherein the first and second surfaces of the hinge frame are
- 2 substantially perpendicular to each other.
- 1 4. The computer of claim 2, wherein the first surface of the hinge frame has at least one
- 2 fixing protrusion protruded toward the rear surface of the display module, and the rear
- 3 surface of the display module has at least one fixing hole corresponding to the fixing
- 4 protrusion of the first surface.
- 1 5. The computer of claim 4, wherein the fixing protrusion is a fastener.
- 1 6. The computer of claim 4, wherein the second surface of the hinge frame is screw-coupled

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2 with the side wall surface of the display case.

1 7. The computer of claim 2, wherein the hinge frame further has a third surface for  
2 supporting an edge of the display surface of the display module, and the third surface is  
3 substantially perpendicular to the second surface.

1 8. A portable computer, comprising:

2 a system body;  
3 a display module having a display surface and a side wall surface;  
4 a display case having an inner surface; and  
5 a hinge pivotally coupling the system body to the display case, the hinge including a  
6 hinge frame having first and second surfaces, the first surface coupled with the inner surface  
7 of the display case, the second surface coupled with the side wall surface of the display  
8 module.

1 9. The computer of claim 8, wherein the display module is a liquid crystal display (LCD)  
2 module.

1 10. The computer of claim 9, wherein the first surface of the hinge frame is screw-coupled  
2 with the inner surface of the display case, and the second surface of the hinge frame is screw-  
3 coupled with the side wall surface of the display module.

1 11. The computer of claim 9, wherein the first surface of the hinge frame has at least one  
2 fixing protrusion protruded toward the inner surface of the display case, and the inner surface

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3 has at least one fixing hole corresponding to the fixing protrusion of the first surface.

1 12. The computer of claim 11, wherein the fixing protrusion is a fastener.

1 13. A computer, comprising:

2 a system body;

3 a display module having a display surface;

4 a display case having side walls, the display module secured between the side walls of  
5 the display case; and

6 a hinge pivotally coupling the body to the display case, the hinge including a hinge  
7 frame coupled to the inner surface of the display case.

1 14. The computer of claim 13, wherein the display module is a liquid crystal display (LCD)  
2 module.

1 15. The computer of claim 14, wherein the hinge frame is screw-coupled with the inner  
2 surface of the display case.

1 16. The computer of claim 14, wherein the hinge frame has at least one fixing protrusion  
2 protruded toward the inner surface of the display case, and the inner surface has at least one  
3 fixing hole corresponding to the fixing protrusion of the hinge frame.

1 17. The computer of claim 16, wherein the fixing protrusion is a fastener.

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1 18. A method for mounting a display module in a portable computer including a system  
2 body, a display case having a side wall surface, a hinge having a hinge frame having first and  
3 second surfaces, the first surface being substantially parallel to a rear surface of the display  
4 module, the second surface being substantially parallel to the side wall surface of the display  
5 case, the hinge pivotally coupling the system body to the display case, the method  
6 comprising:

7 arranging the hinge frame so that the first surface thereof is positioned between the  
8 display case and the rear surface of the display module, and so that the second surface thereof  
9 is positioned between the display module and the side wall surface of the display case;

10 fastening the first surface of the hinge frame to the rear surface of the display module;  
11 and

12 fastening the second surface of the hinge frame to the side wall surface of the display  
13 case.

1 19. The method of claim 18, wherein the display module is a liquid crystal display (LCD)  
2 module.

1 20. The method of claim 18, wherein the first surface of the hinge frame has at least one  
2 fixing protrusion protruded toward the rear surface of the display module, and the rear  
3 surface of the display module has at least one fixing hole corresponding to the fixing  
4 protrusion of the first surface of the hinge frame.

1 21. The method of claim 18, wherein the first surface of the hinge frame is screw-coupled  
2 with the rear surface of the display module.

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1 22. The method of claim 18, wherein the second surface of the hinge frame is screw-coupled  
2 with the side wall surface of the display case.

1 23. A method for mounting a display module having a side wall surface in a portable  
2 computer including a system body, a display case having inner and side wall surfaces, a hinge  
3 having a hinge frame having first and second surfaces, the first surface being substantially  
4 parallel to a rear surface of the display module, the second surface being substantially parallel  
5 to the side wall surface of the display case, the hinge pivotally coupling the system body to  
6 the display case, the method comprising:

7 arranging the hinge frame so that the first surface thereof is positioned between the  
8 display case and the rear surface of the display module, and so that the second surface thereof  
9 is positioned between the display module and the side wall surface of the display case;

10 fastening the first surface of the hinge frame to the inner surface of the display case;  
11 and

12 fastening the second surface of the hinge frame to the side wall surface of the display  
13 module.

1 24. The method of claim 23, wherein the display module is a liquid crystal display (LCD)  
2 module.

1 25. The method of claim 23, wherein the first surface of the hinge frame is screw-coupled  
2 with the inner surface of the display case.

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1 26. The method of claim 23, wherein the second surface of the hinge frame is screw-coupled  
2 with the side wall surface of the display module.

1 27. The method of claim 23, wherein the first surface of the hinge frame is coupled to the  
2 inner surface of the display case by a fastener.

1 28. A method for mounting a display module having a side wall surface in a portable  
2 computer including a system body, a display case having an inner and two side wall surfaces,  
3 a hinge having a hinge frame, the hinge pivotally coupling the system body to the display  
4 case, the method comprising:

5       arranging the hinge frame so that a surface thereof is positioned between the inner  
6 surface of the display case and the rear surface of the display module;  
7       fastening the surface of the hinge frame to the inner surface of the display case; and  
8       securing the display module between the side walls of the display case.

1 29. The method of claim 28, wherein the display module is a liquid crystal display (LCD)  
2 module.

1 30. The method of claim 28, wherein the surface of the hinge frame is screw-coupled with the  
2 inner surface of the display case.

1 31. The method of claim 28, wherein the surface of the hinge frame is coupled to the inner  
2 surface of the display case by a fastener.

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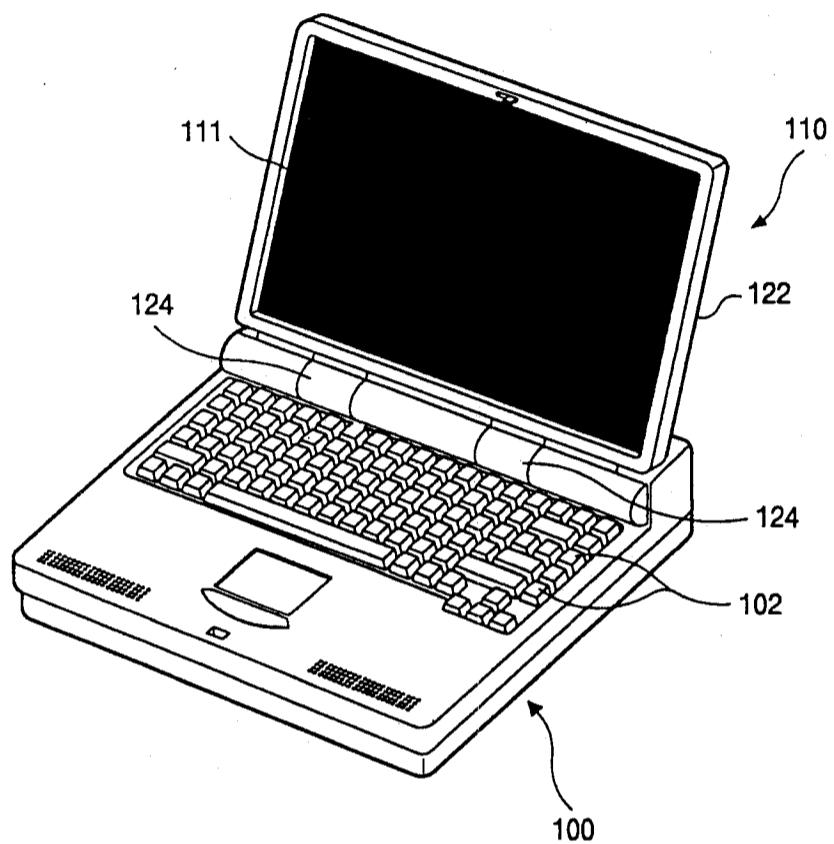


FIG. 1

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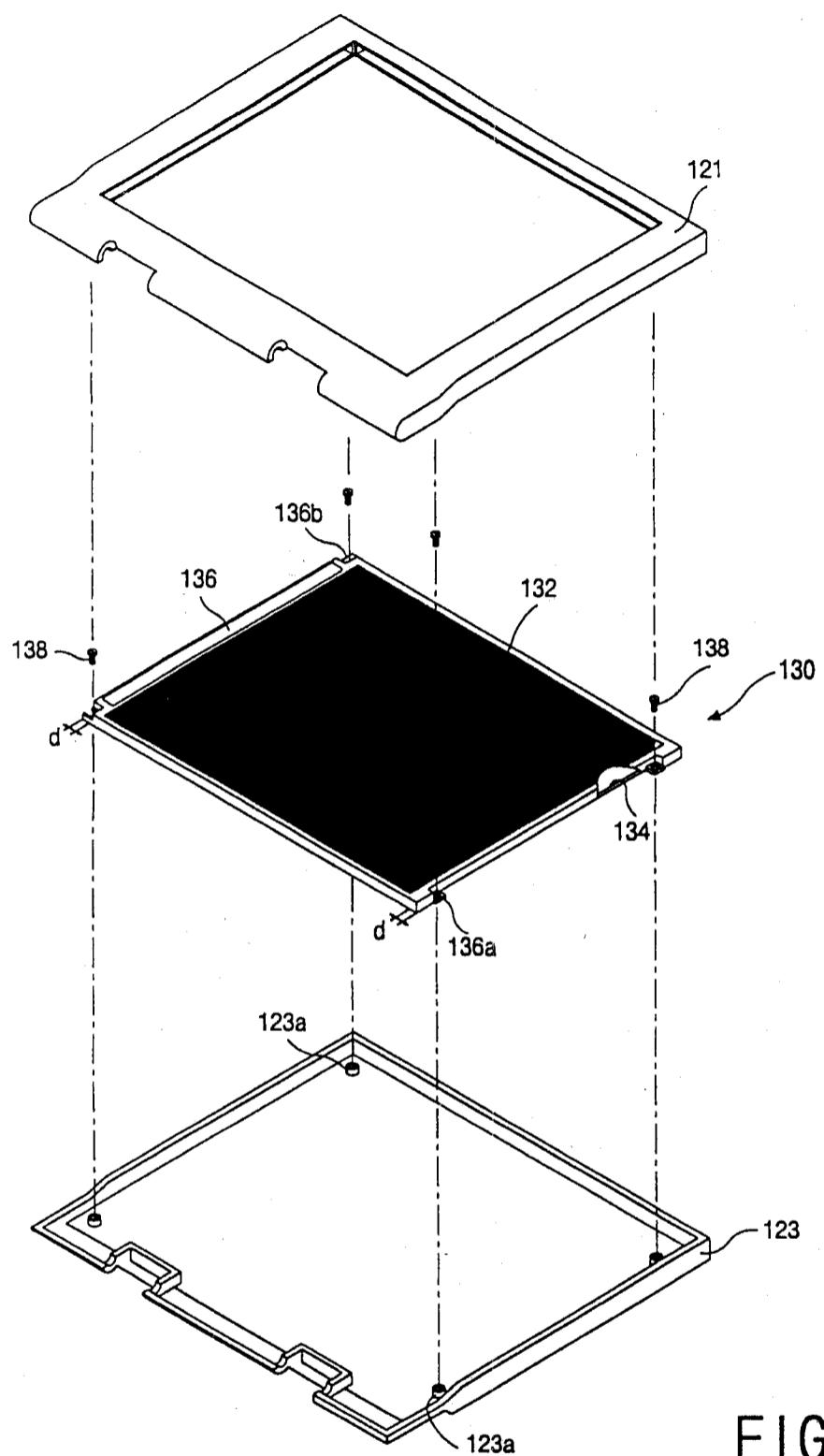
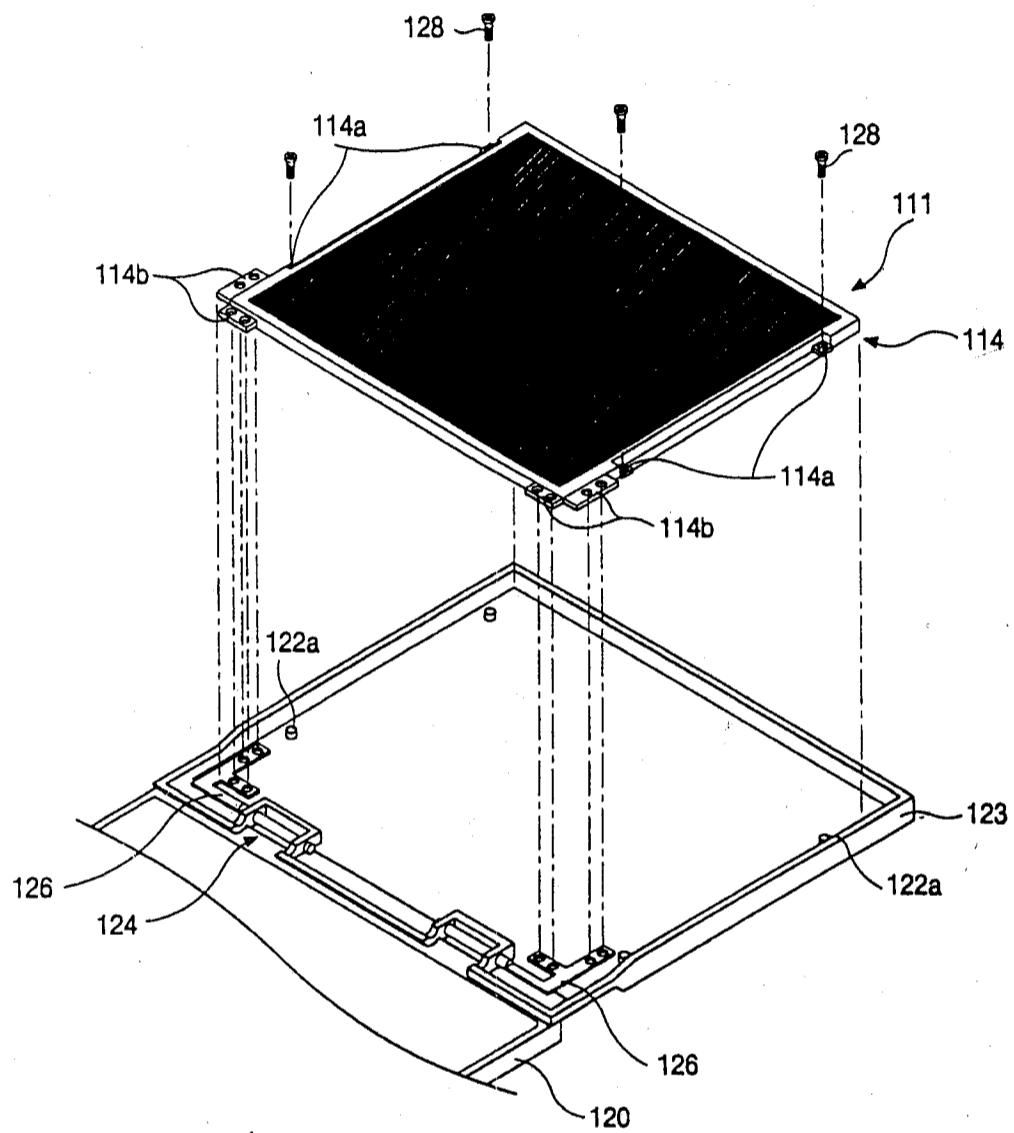


FIG. 2

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**FIG. 3A**

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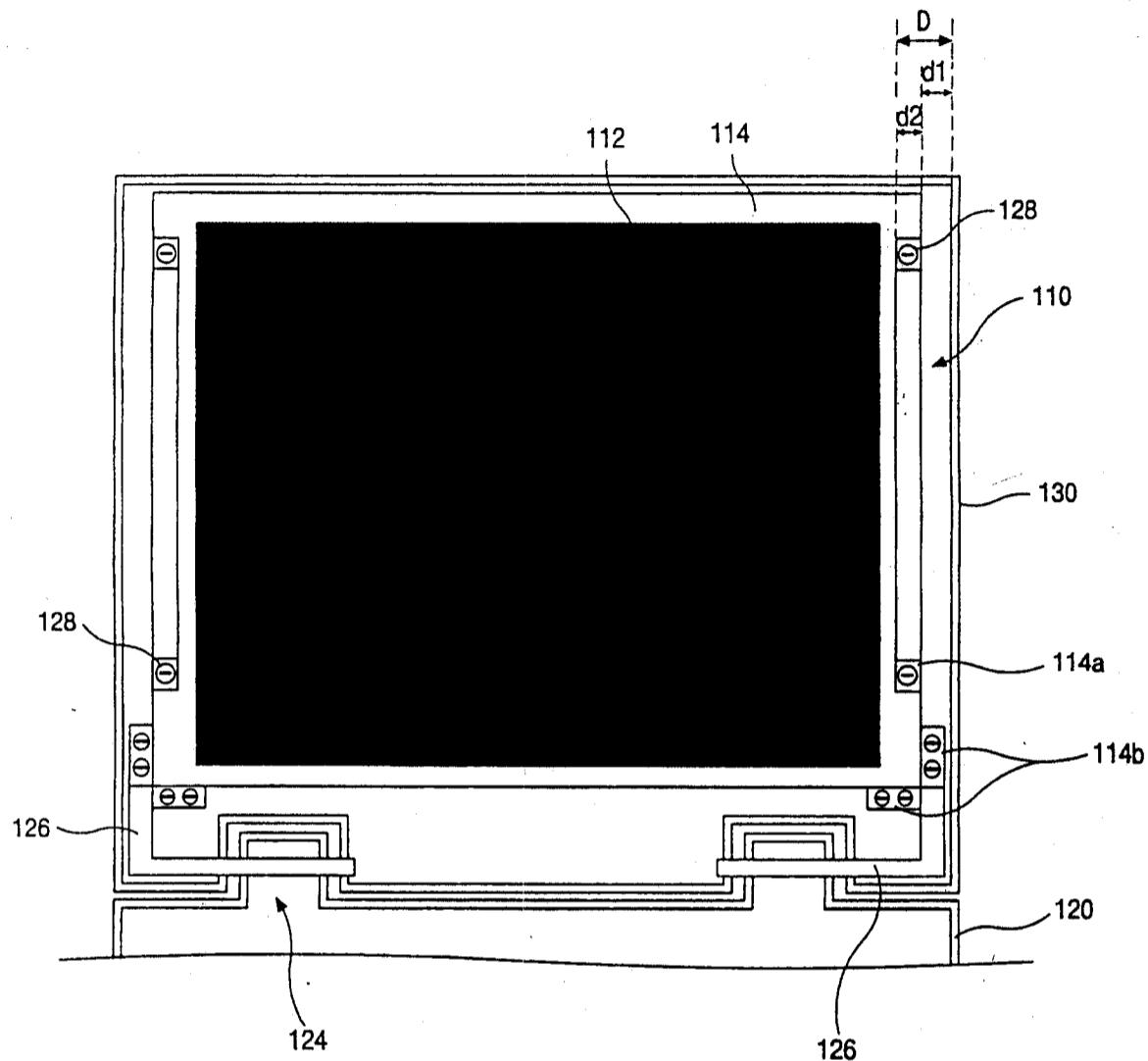


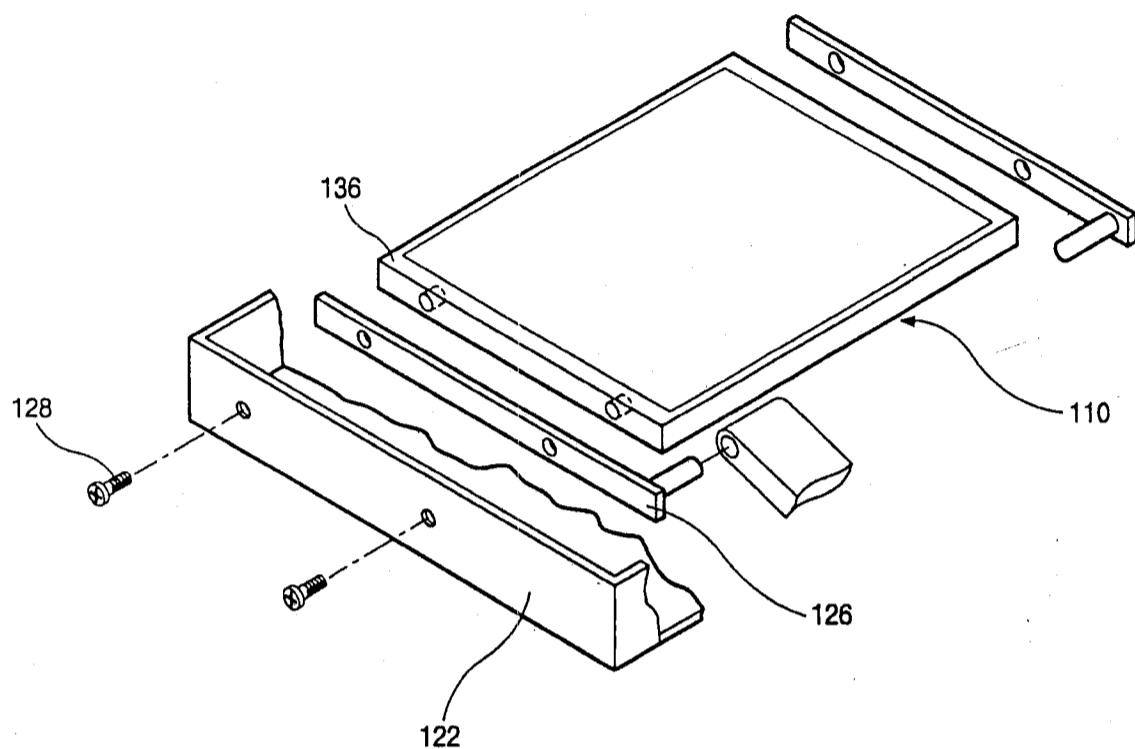
FIG. 3B

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**FIG. 4**

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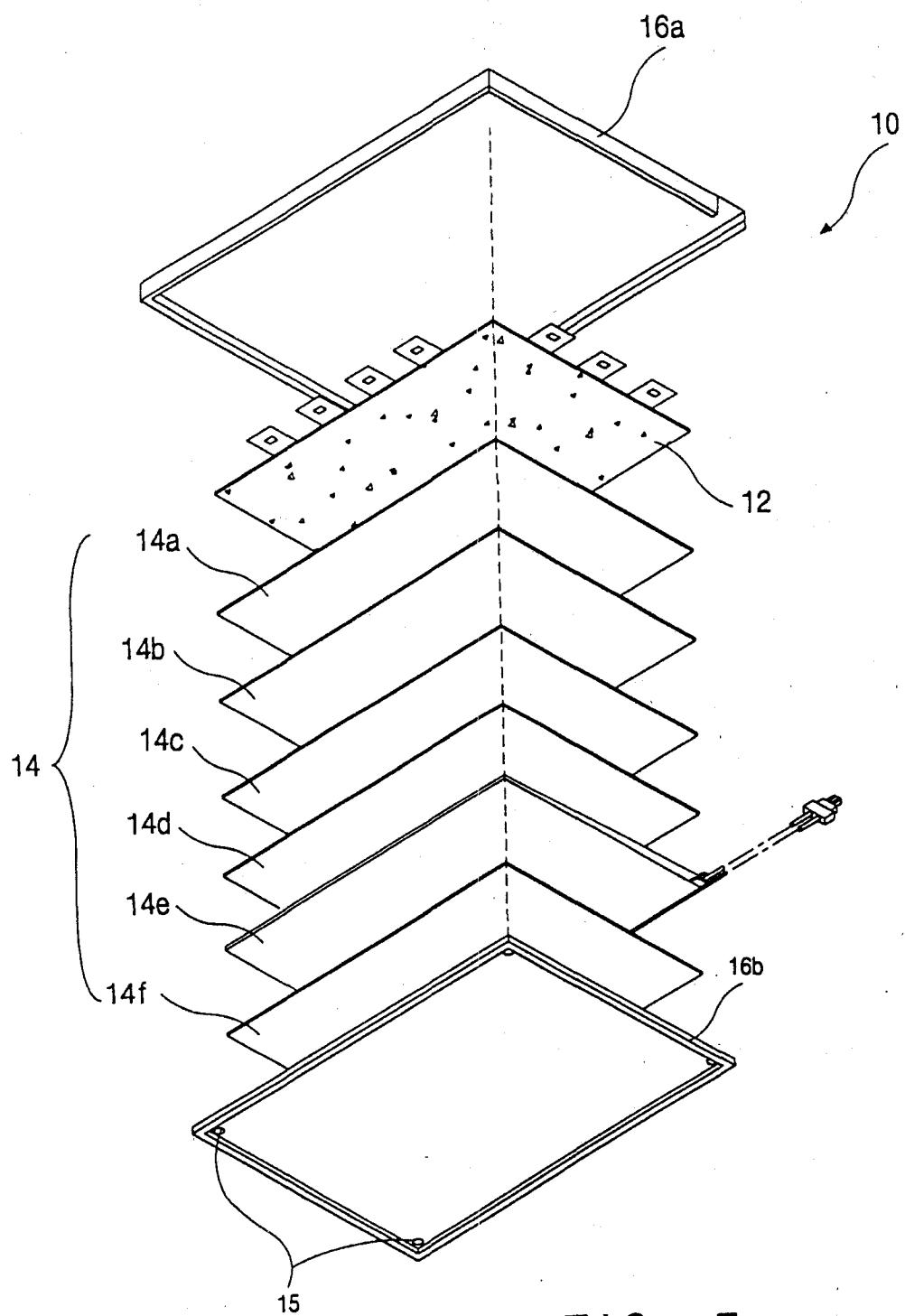


FIG. 5

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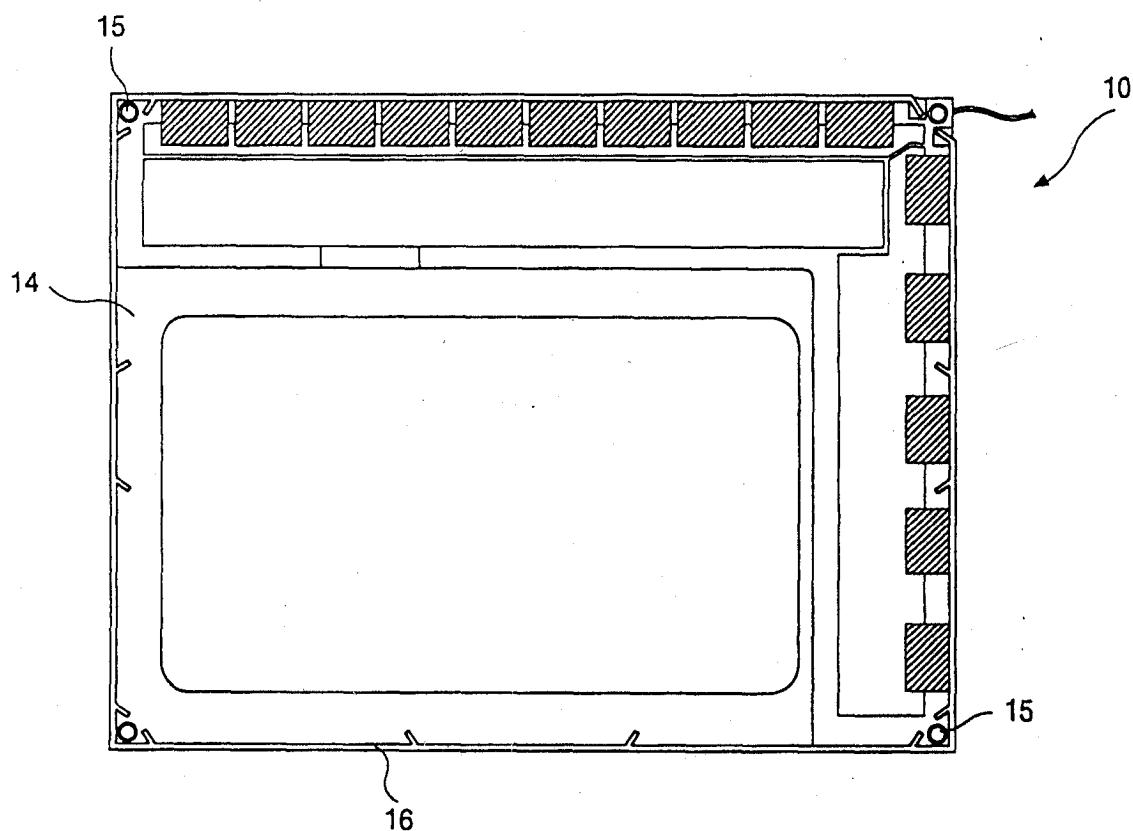


FIG. 6

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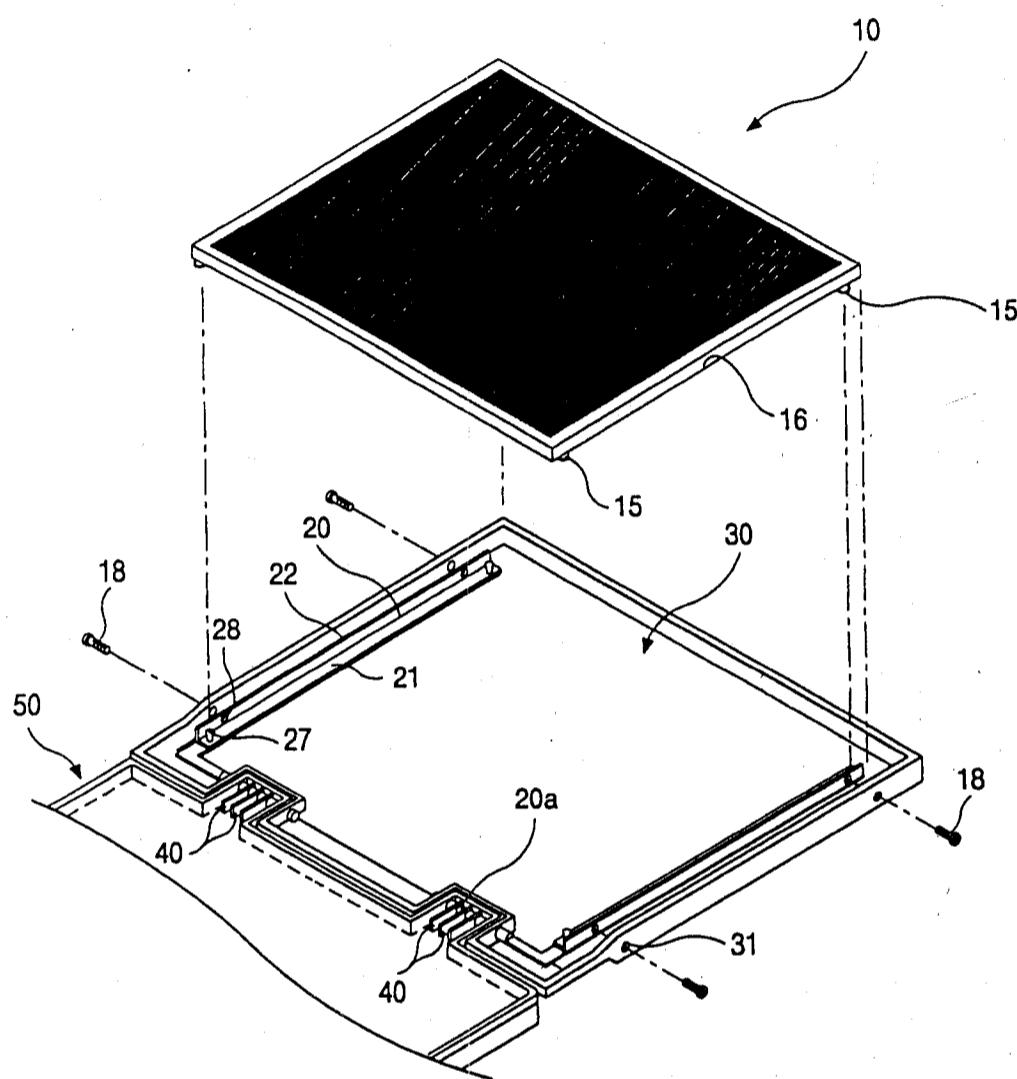


FIG. 7

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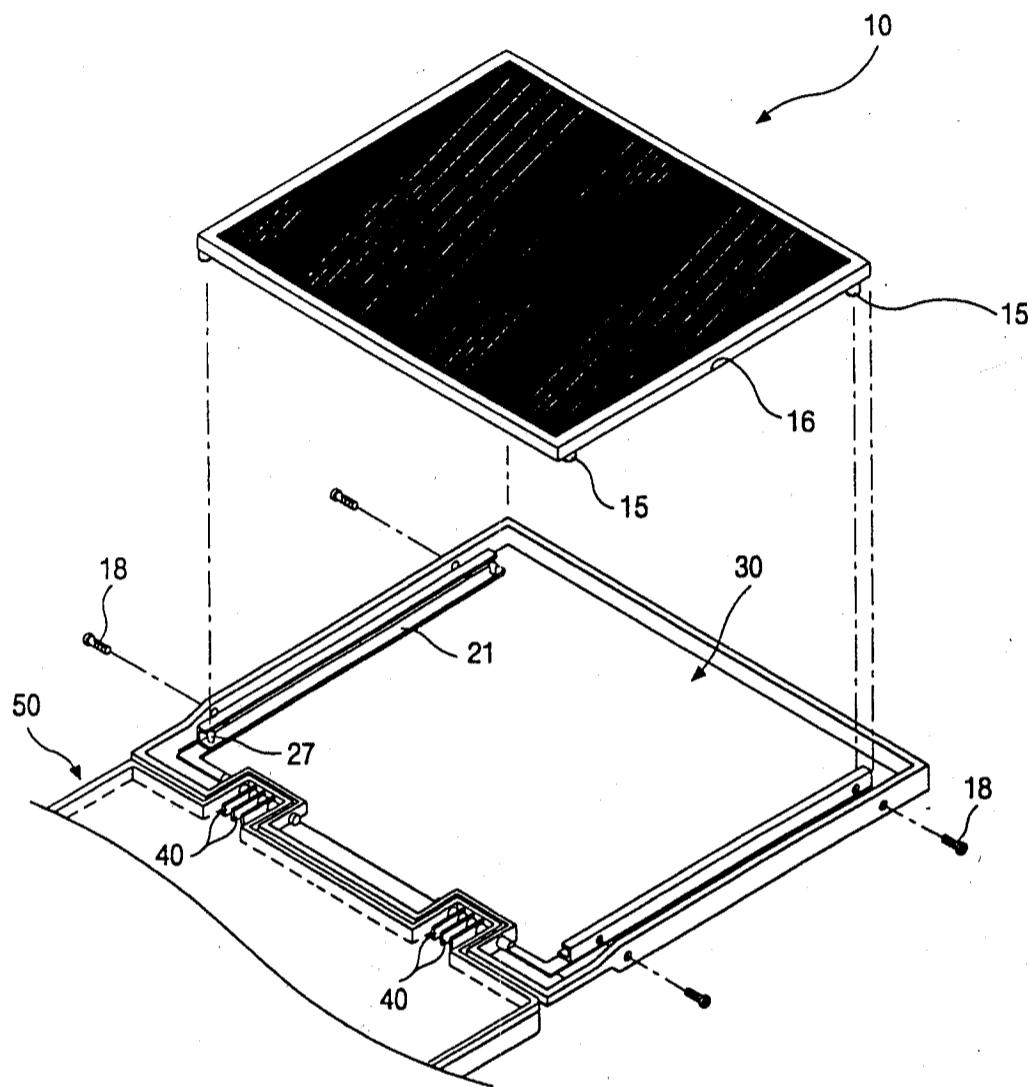


FIG. 8

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VS078233

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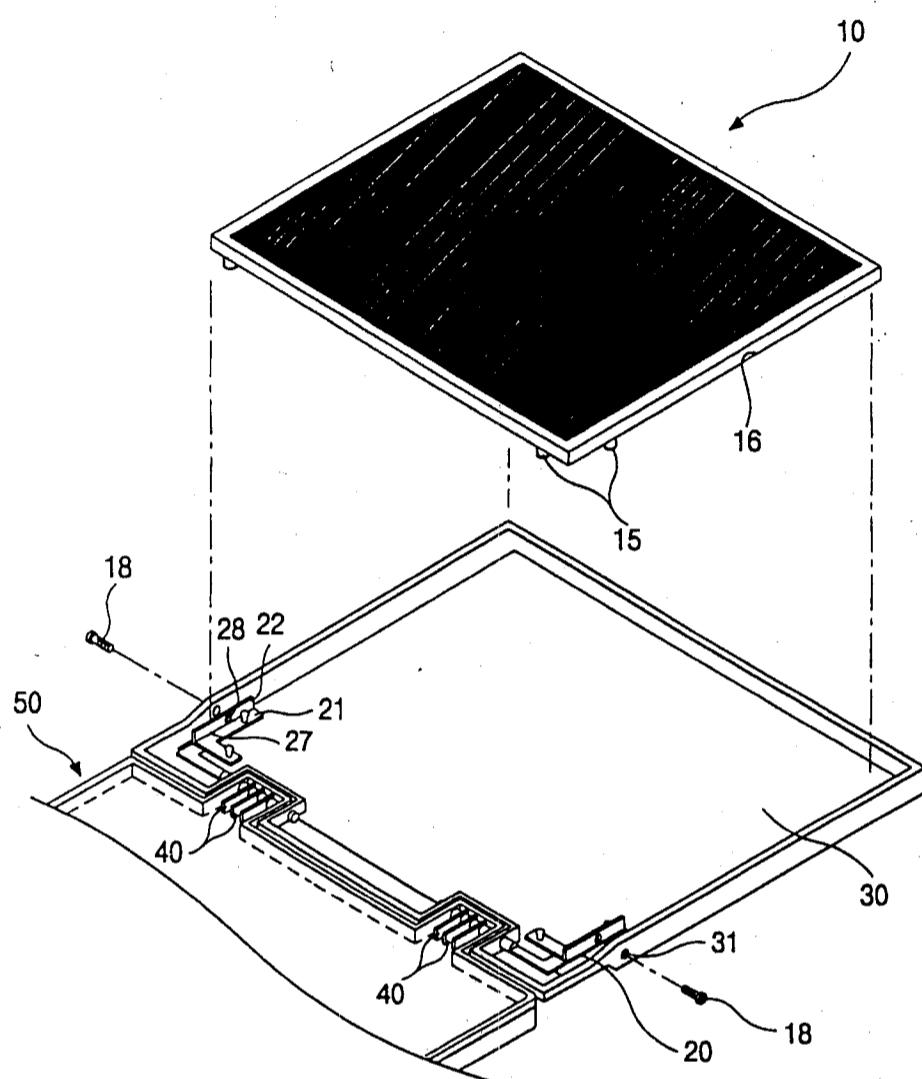


FIG. 9

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VS078234

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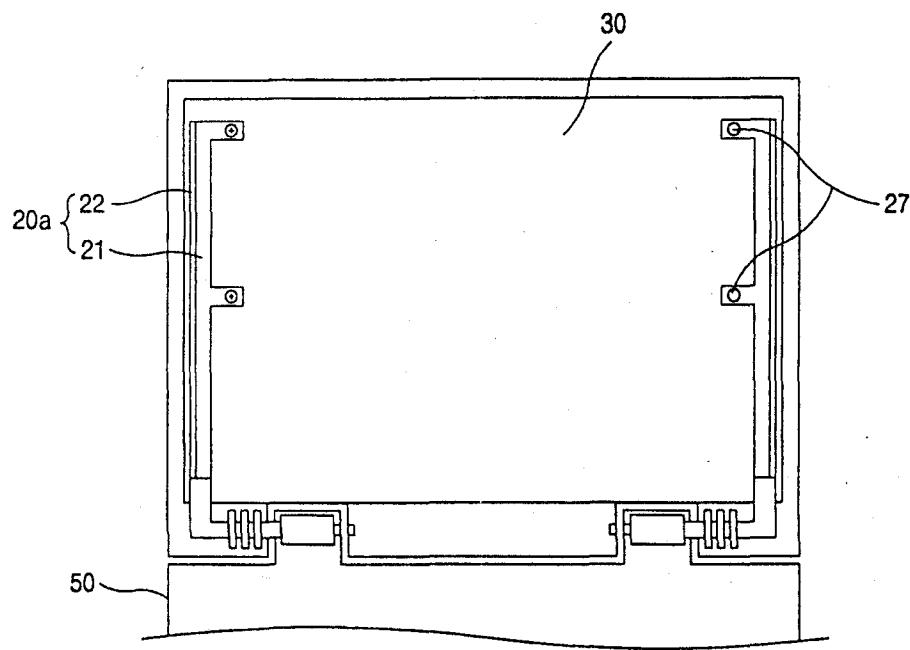


FIG. 10a

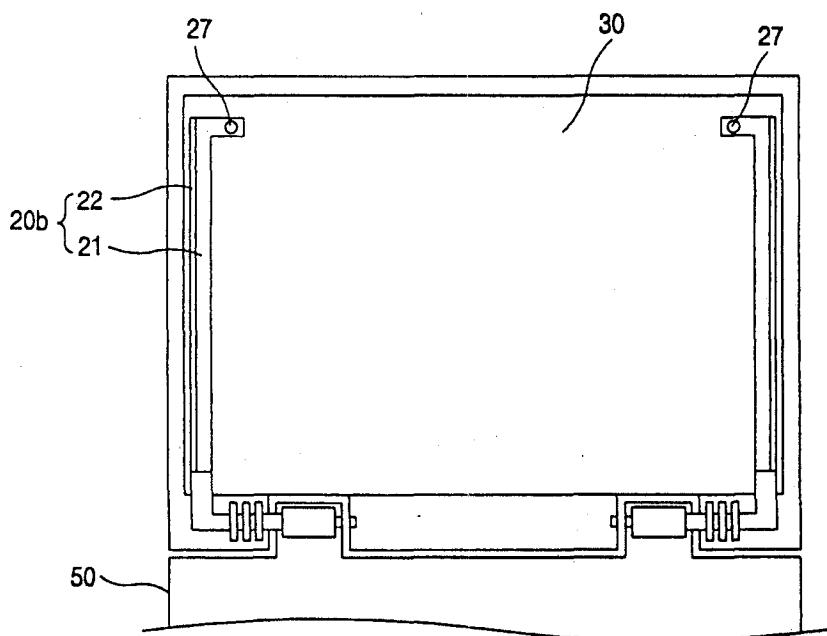


FIG. 10b

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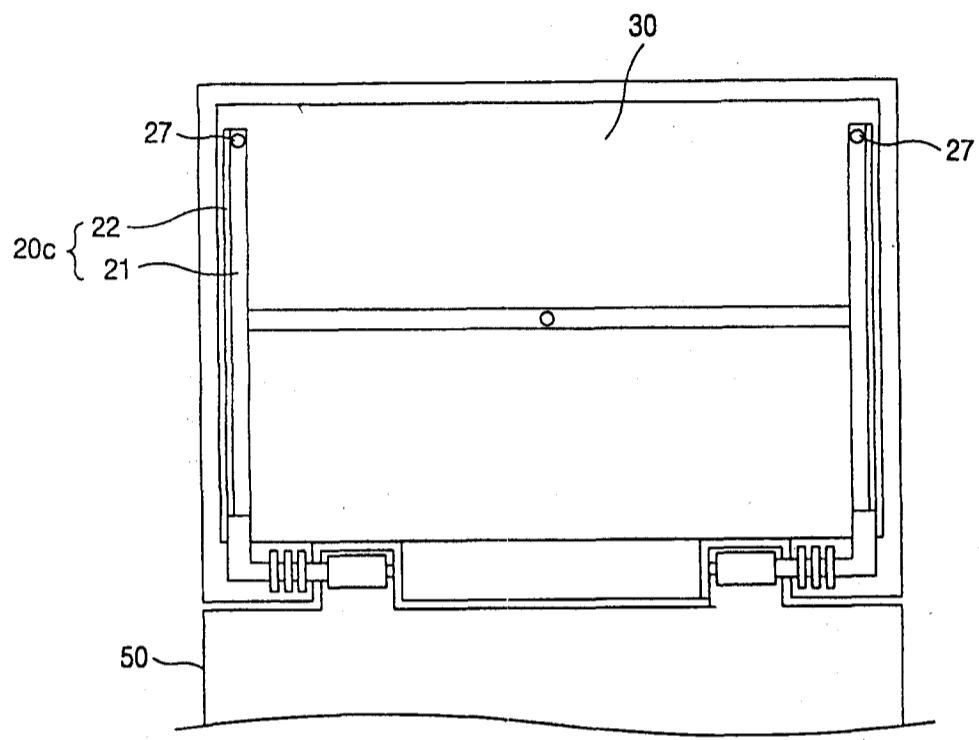


FIG. 10c

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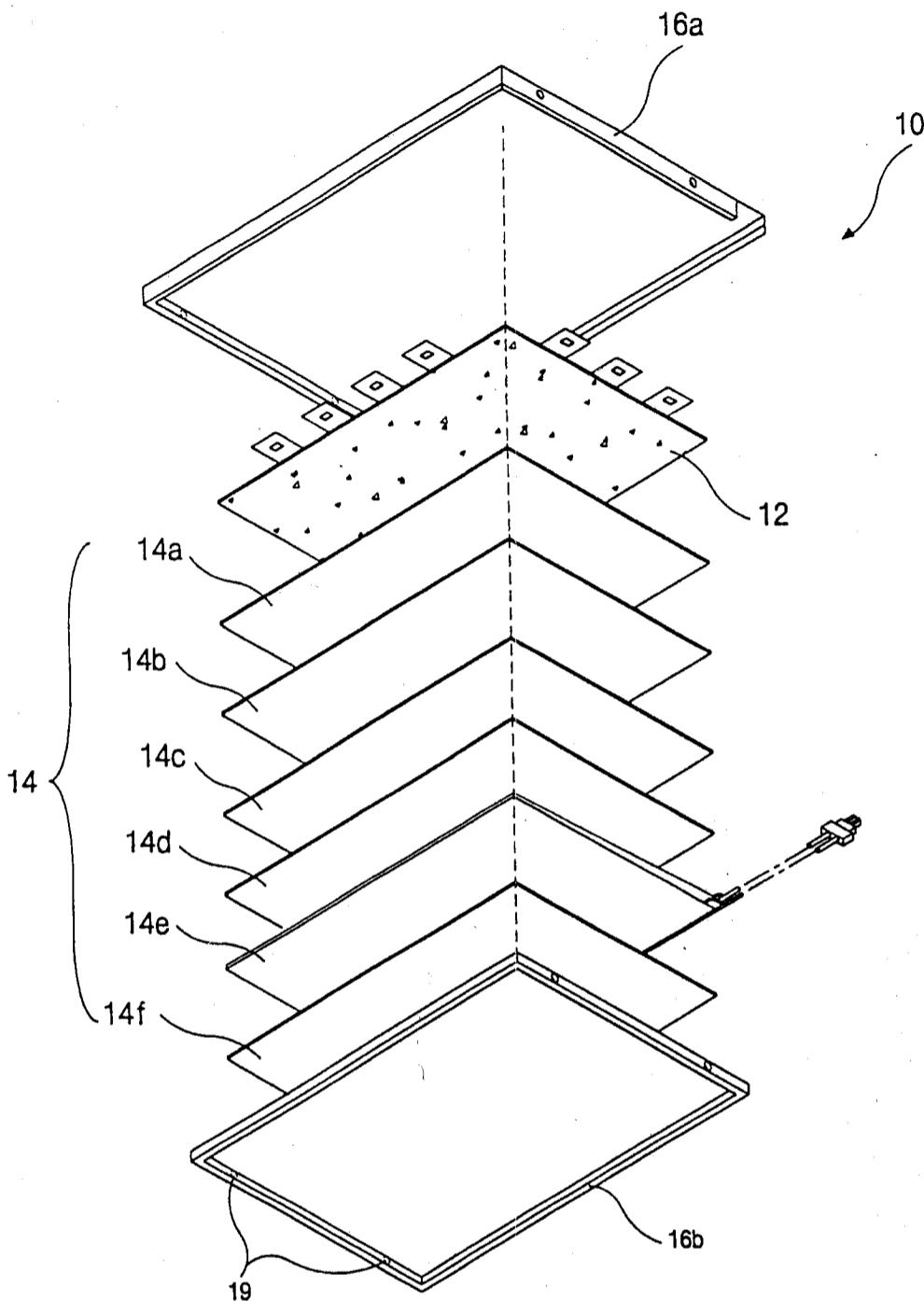


FIG. 11

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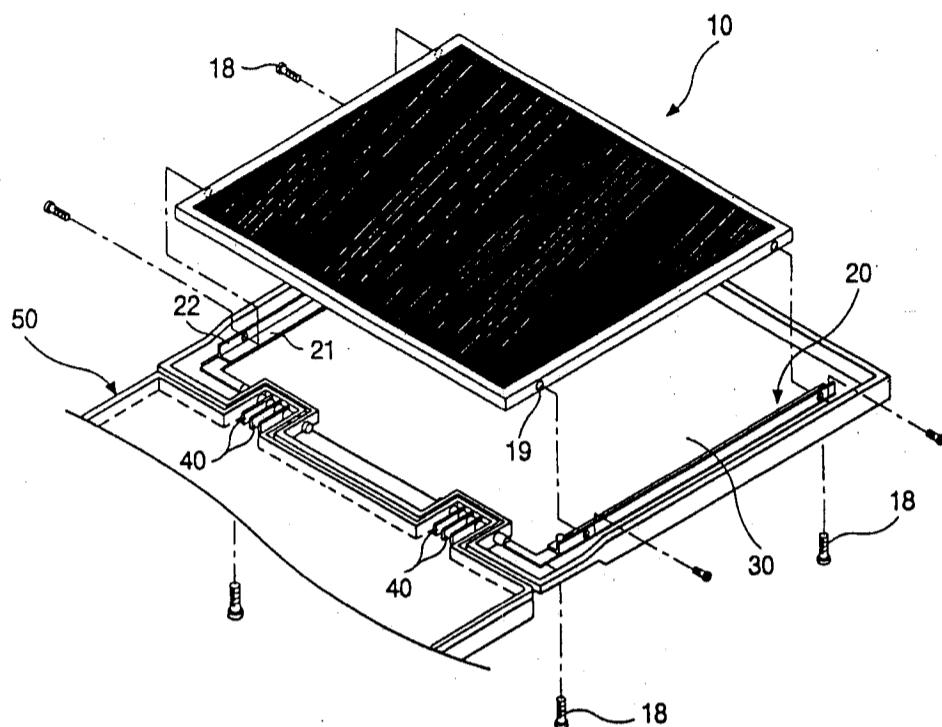


FIG. 12

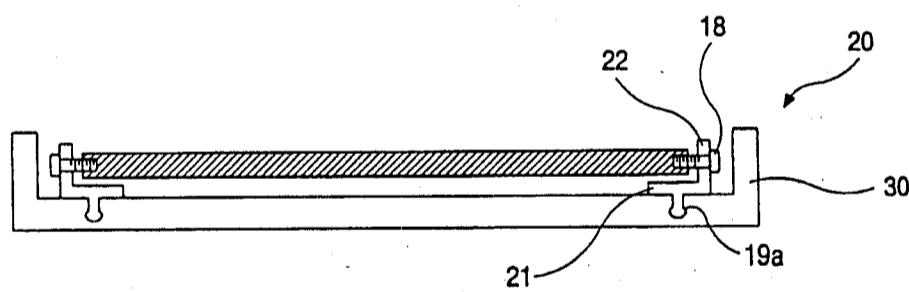


FIG. 13

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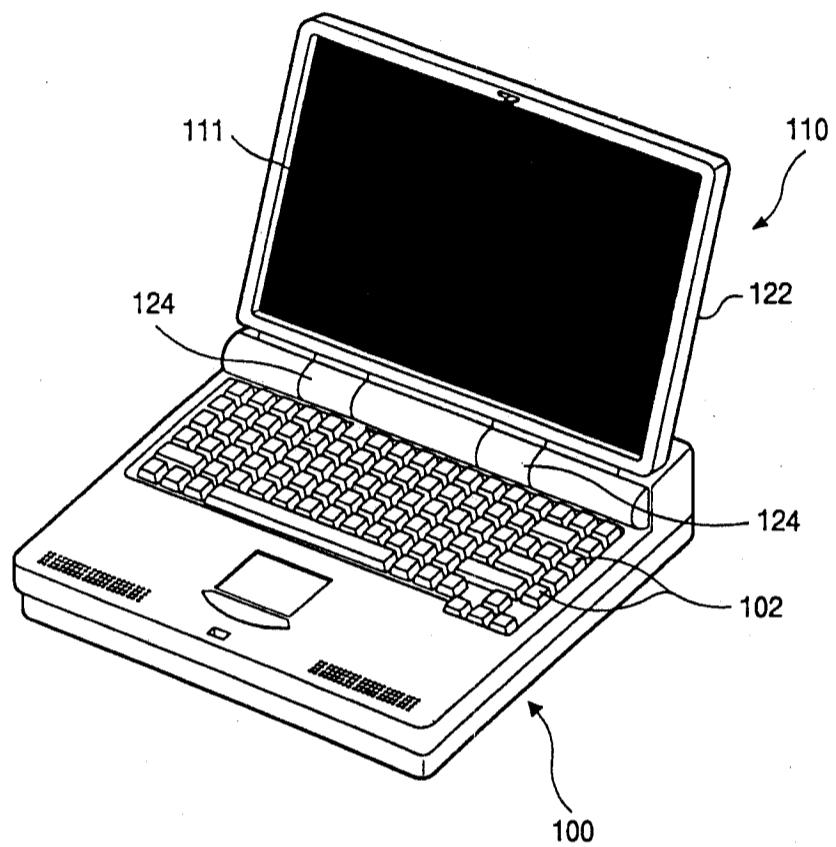


FIG. 1

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VS078239

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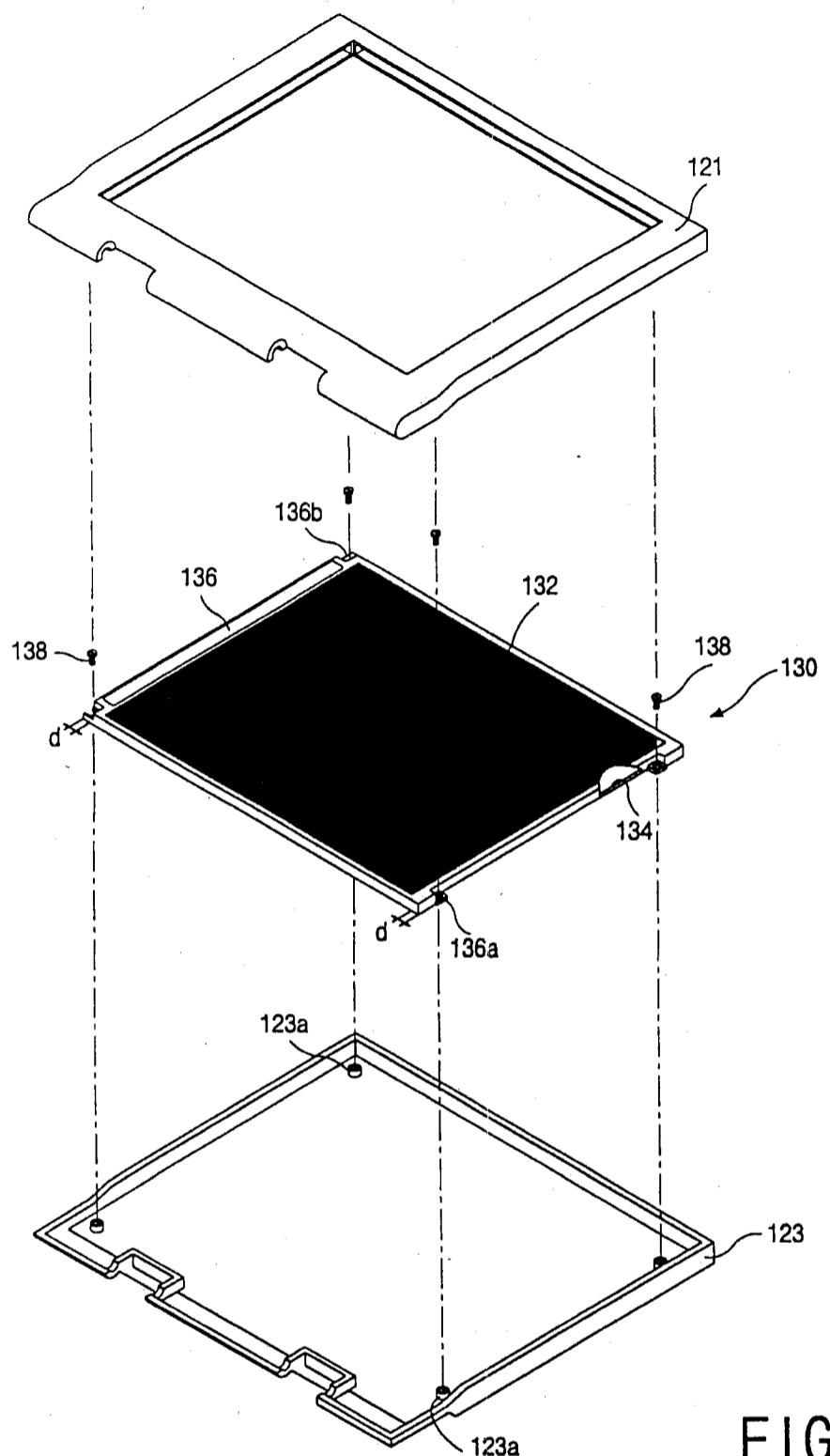


FIG. 2

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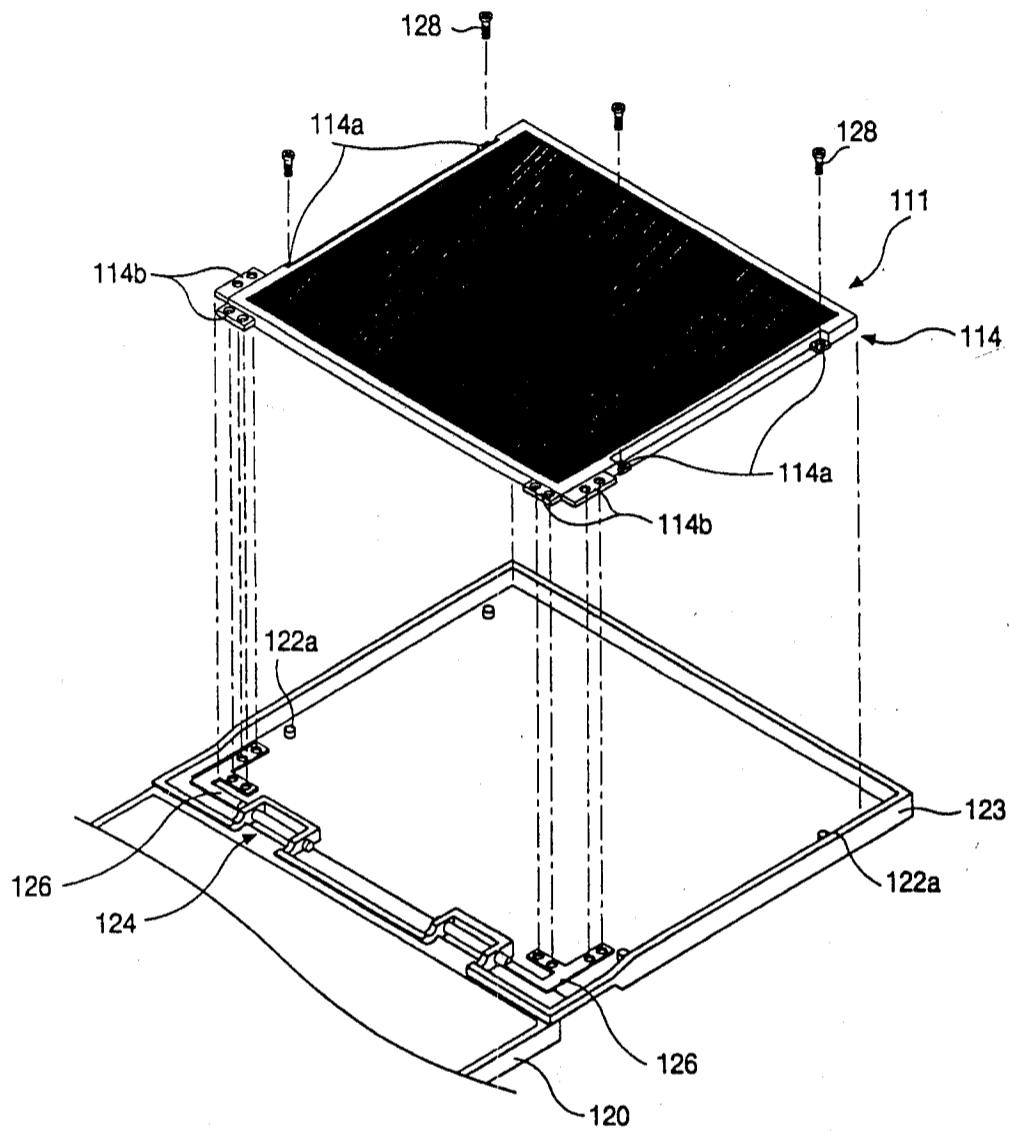


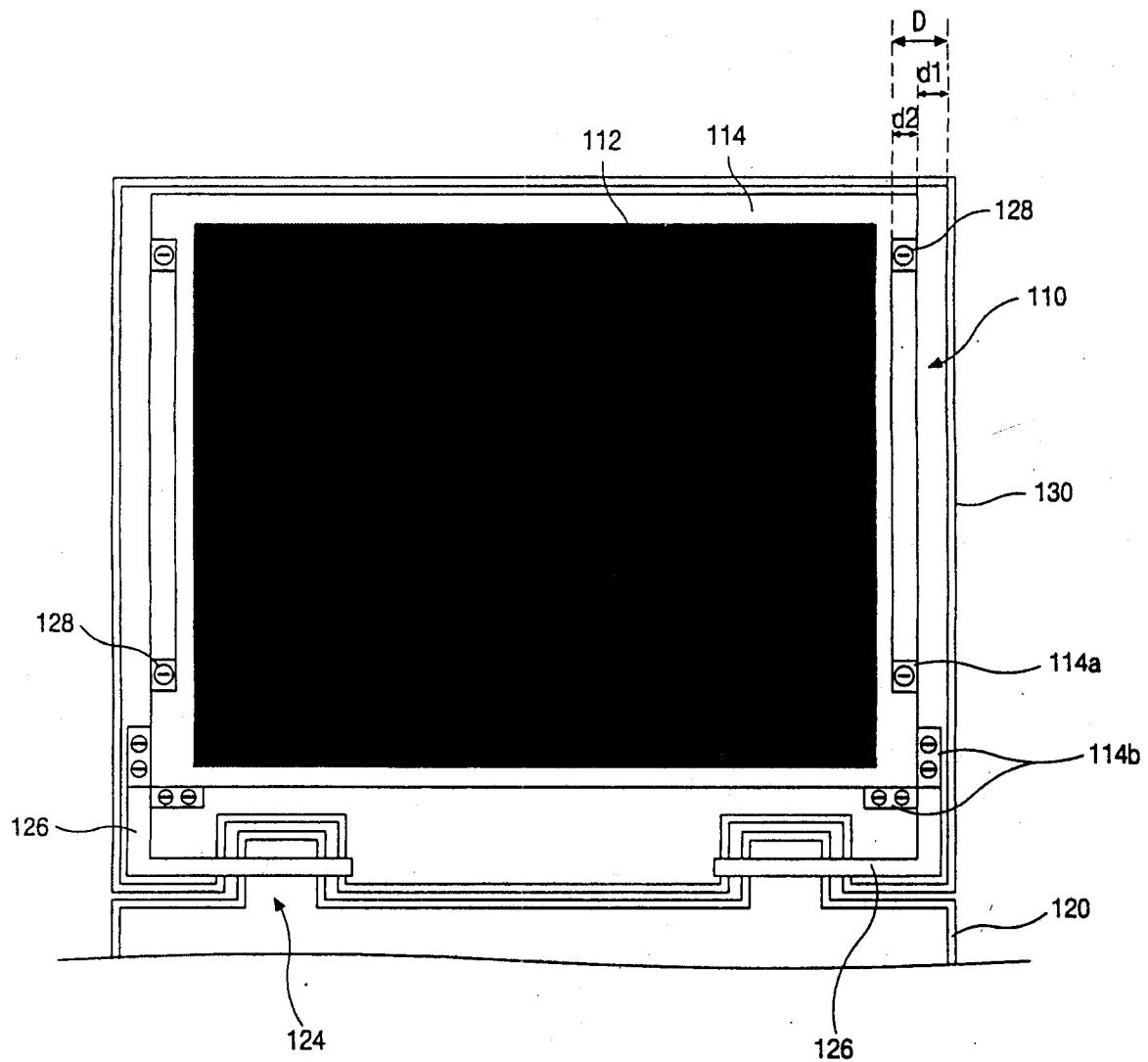
FIG. 3A

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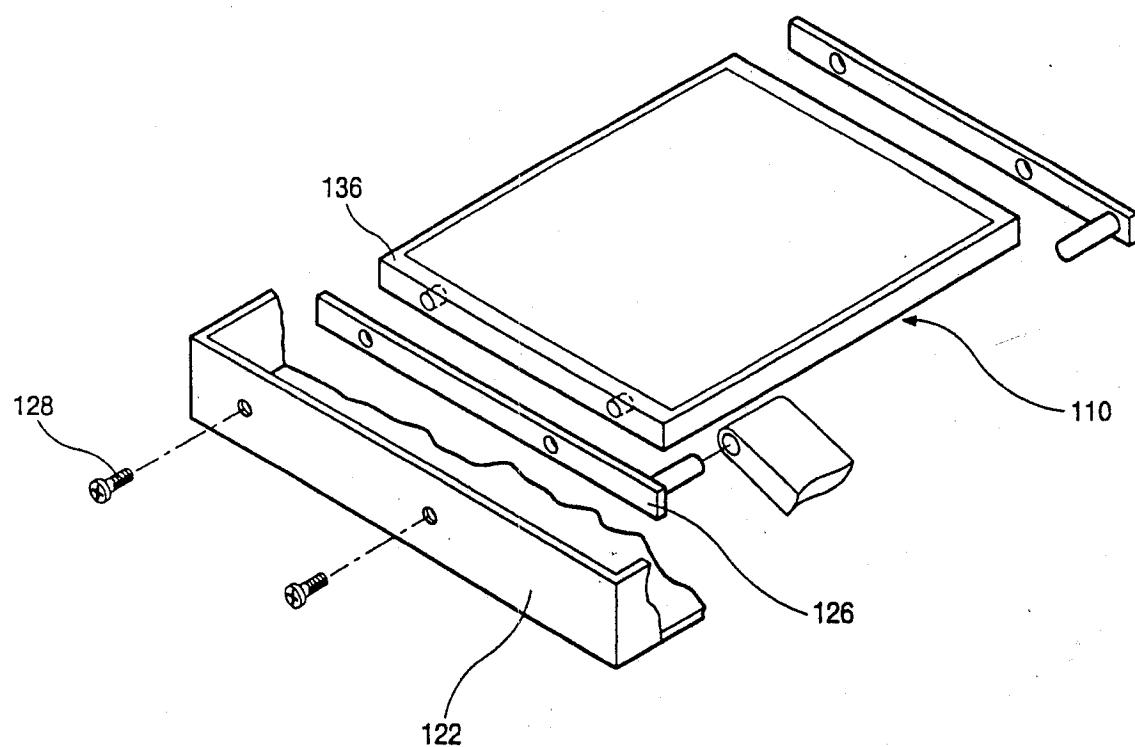


FIG. 4

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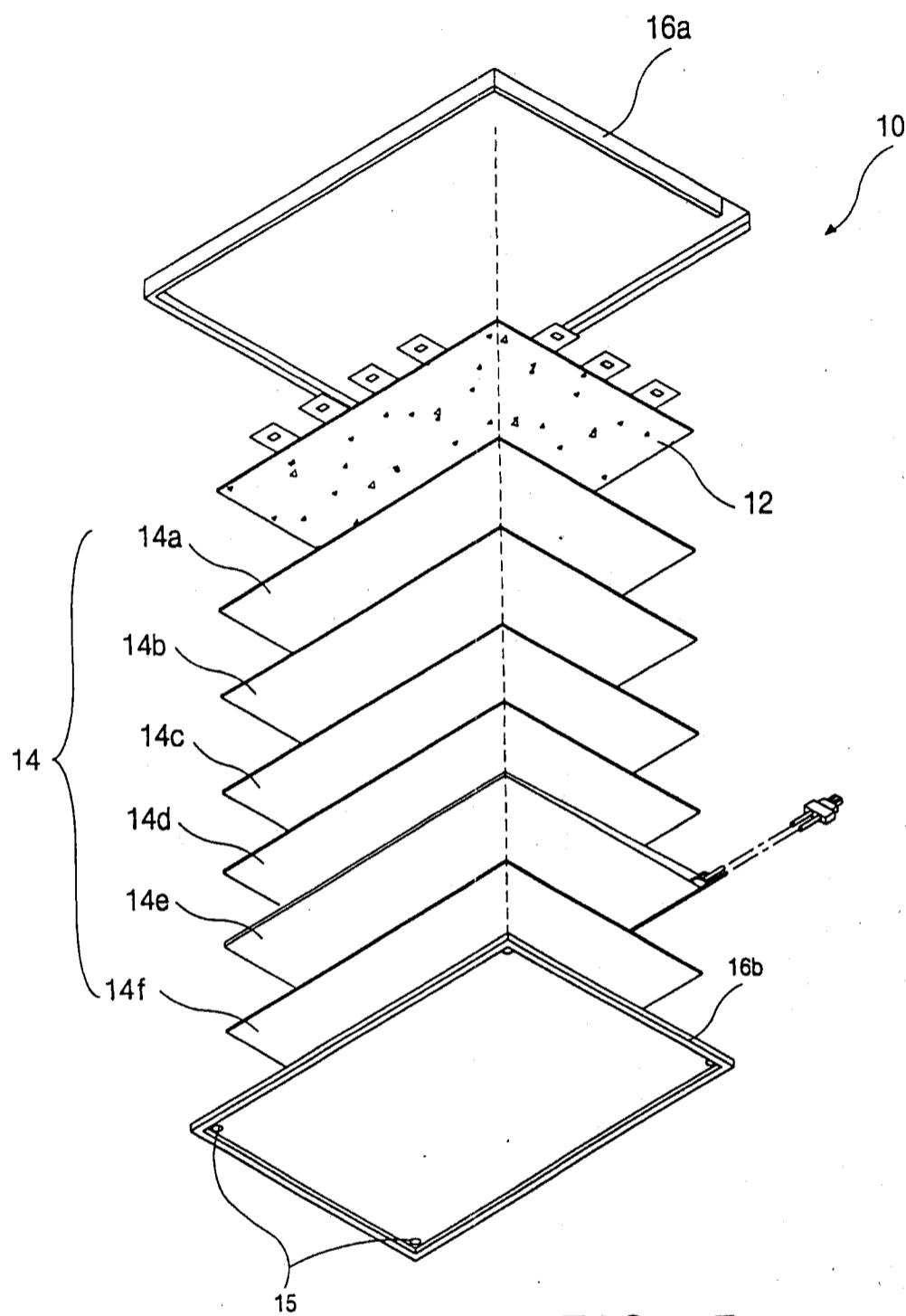


FIG. 5

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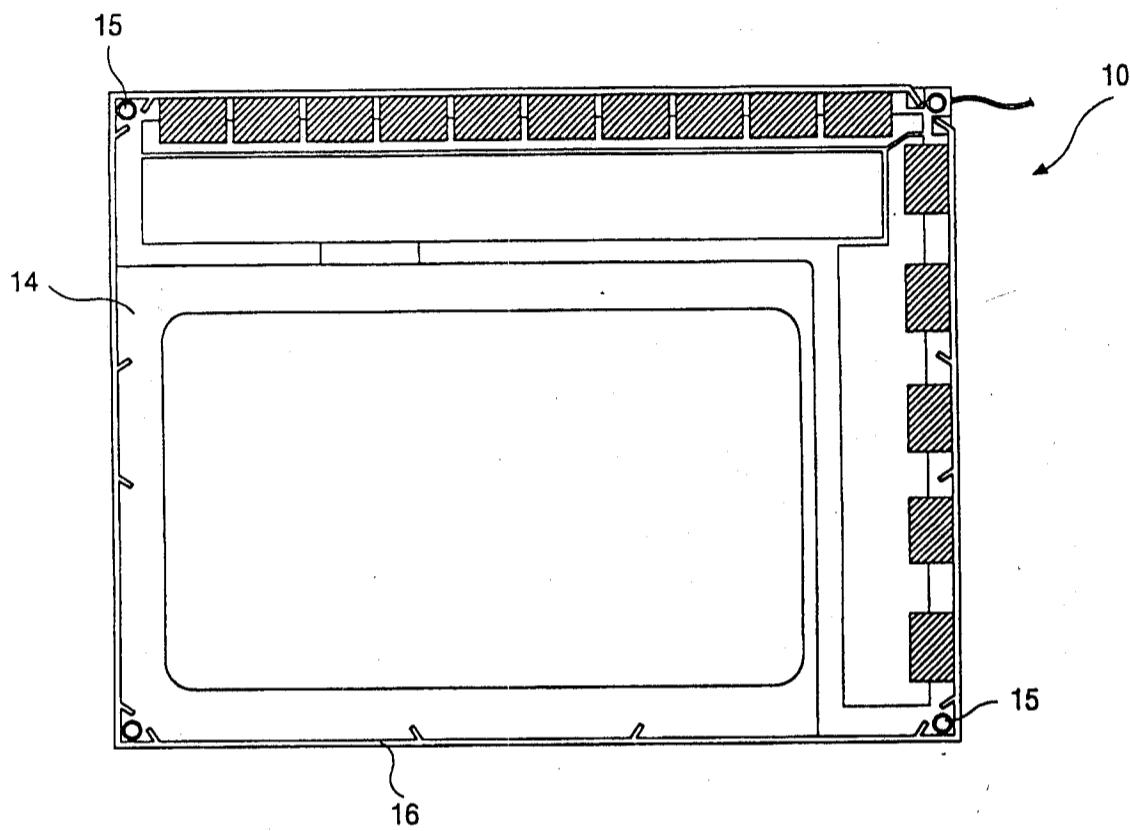


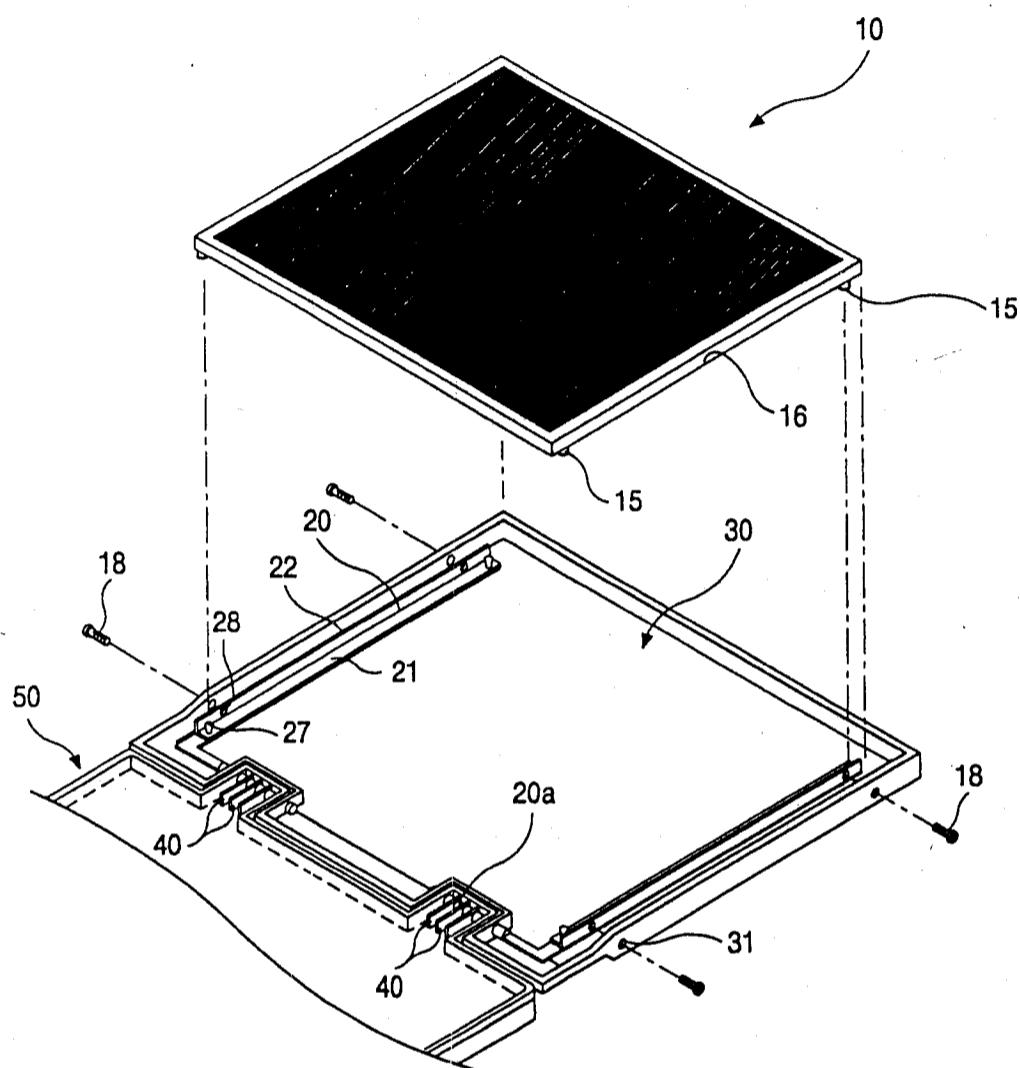
FIG. 6

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**FIG. 7**

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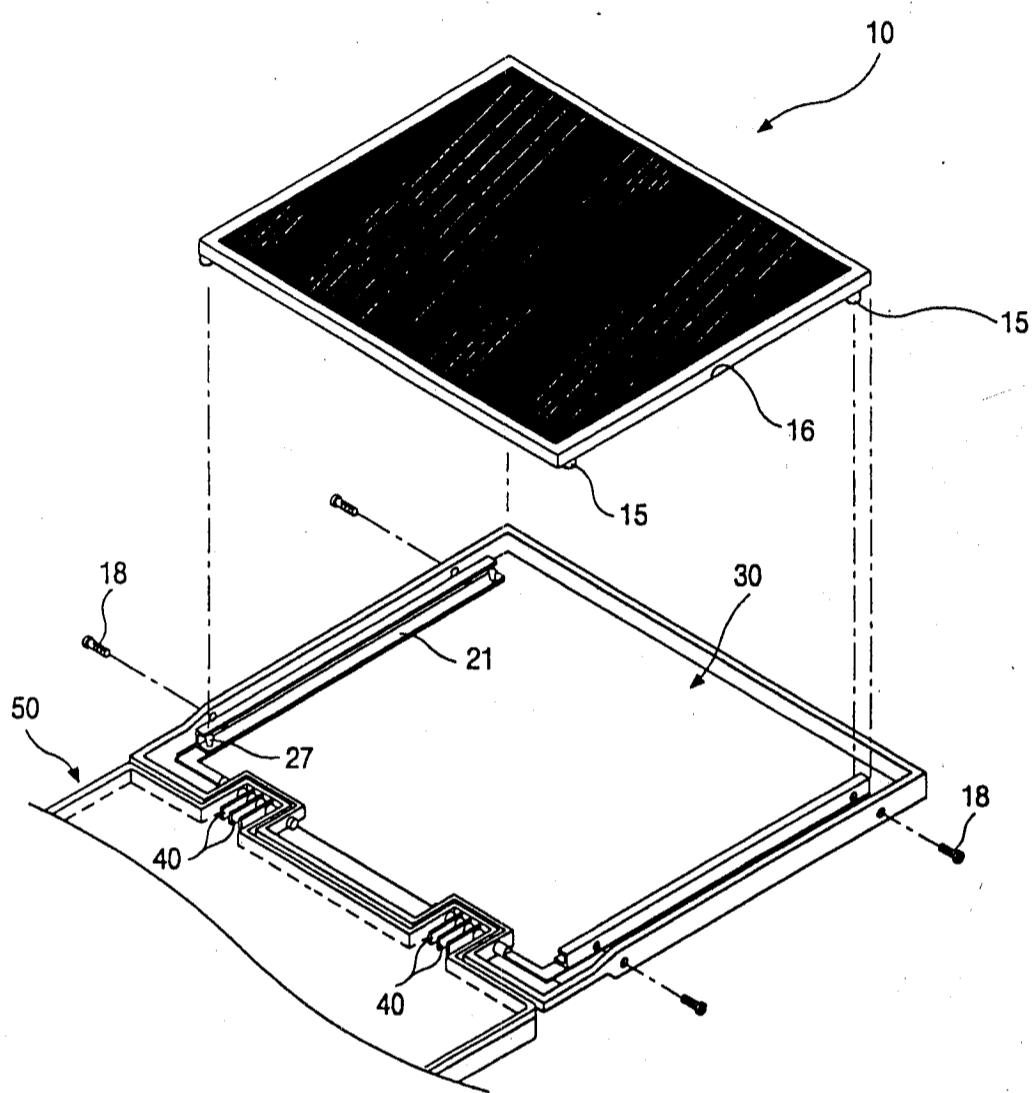


FIG. 8

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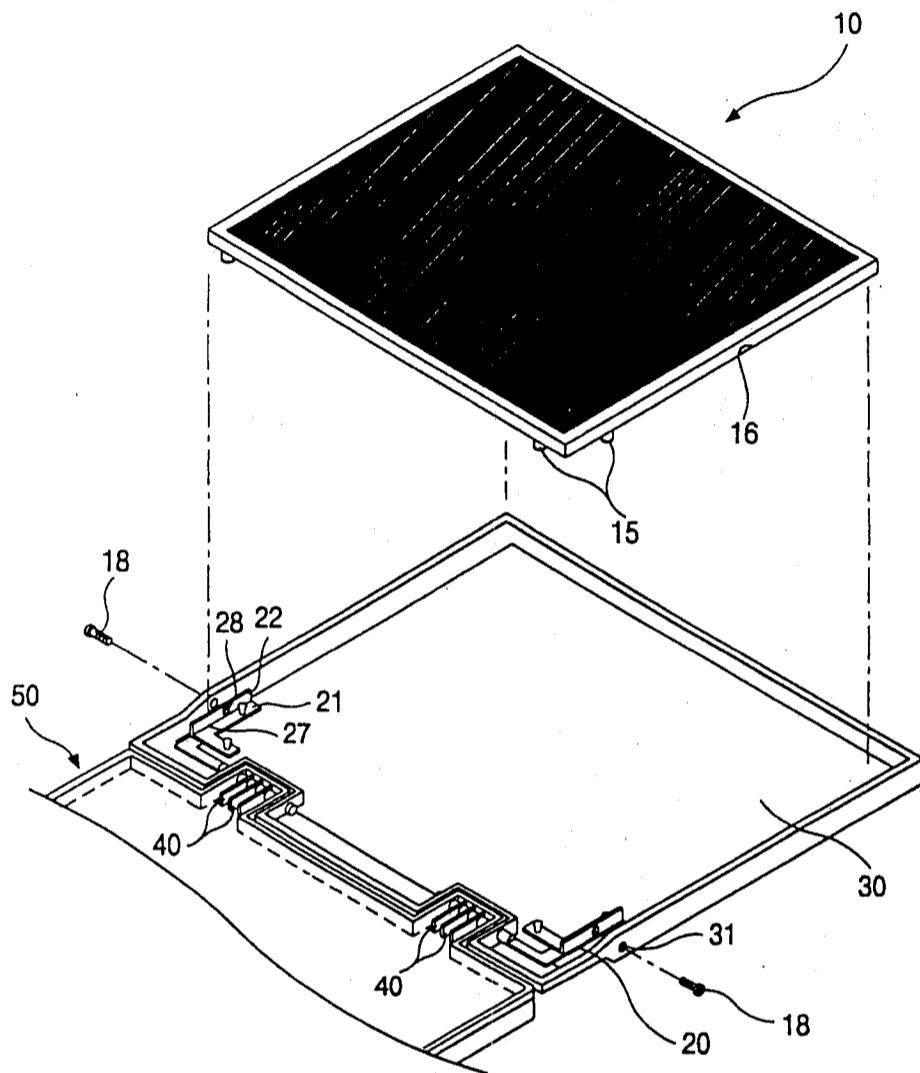


FIG. 9

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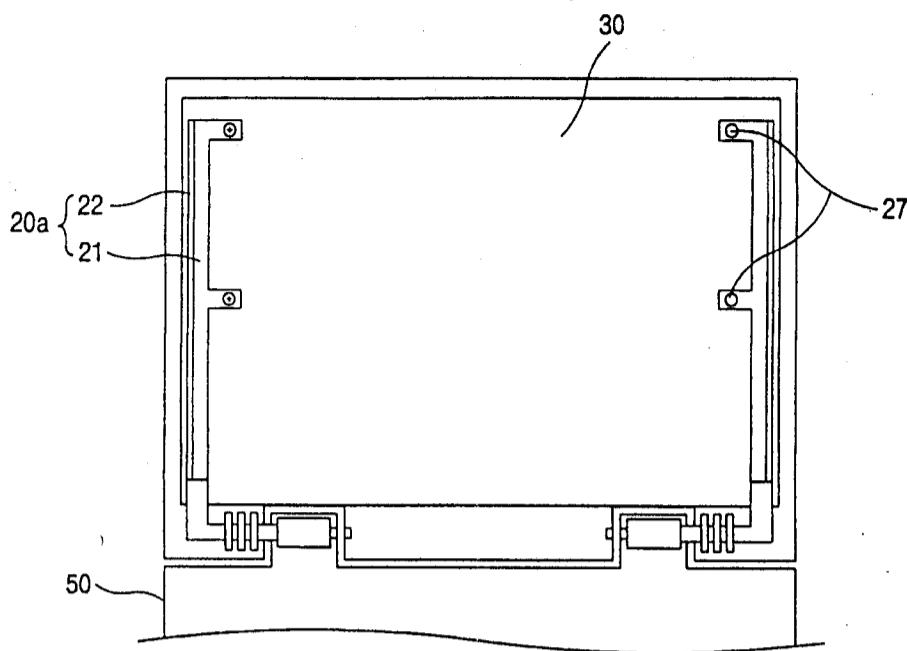


FIG. 10a

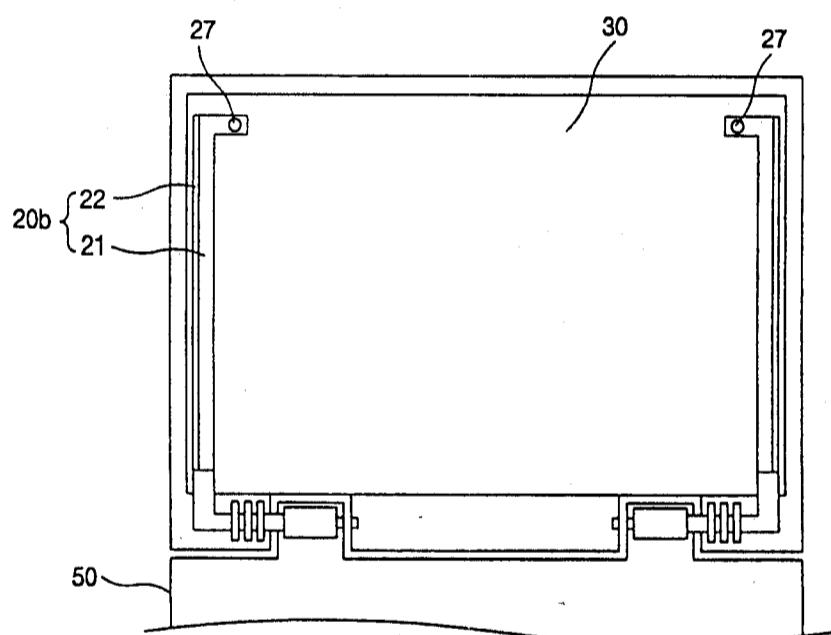


FIG. 10b

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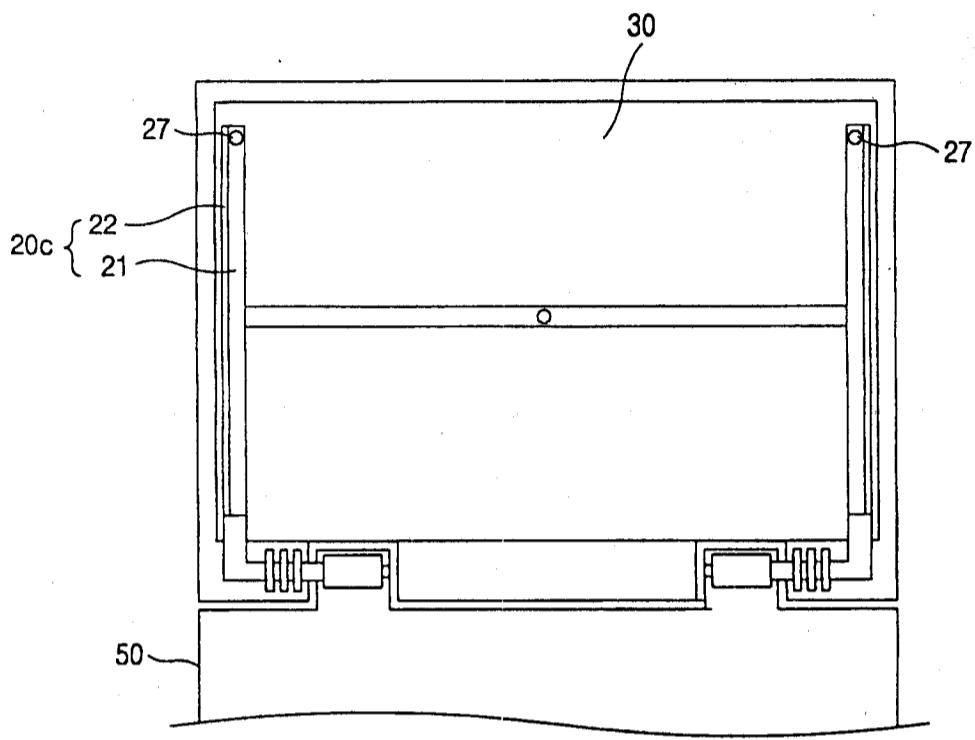


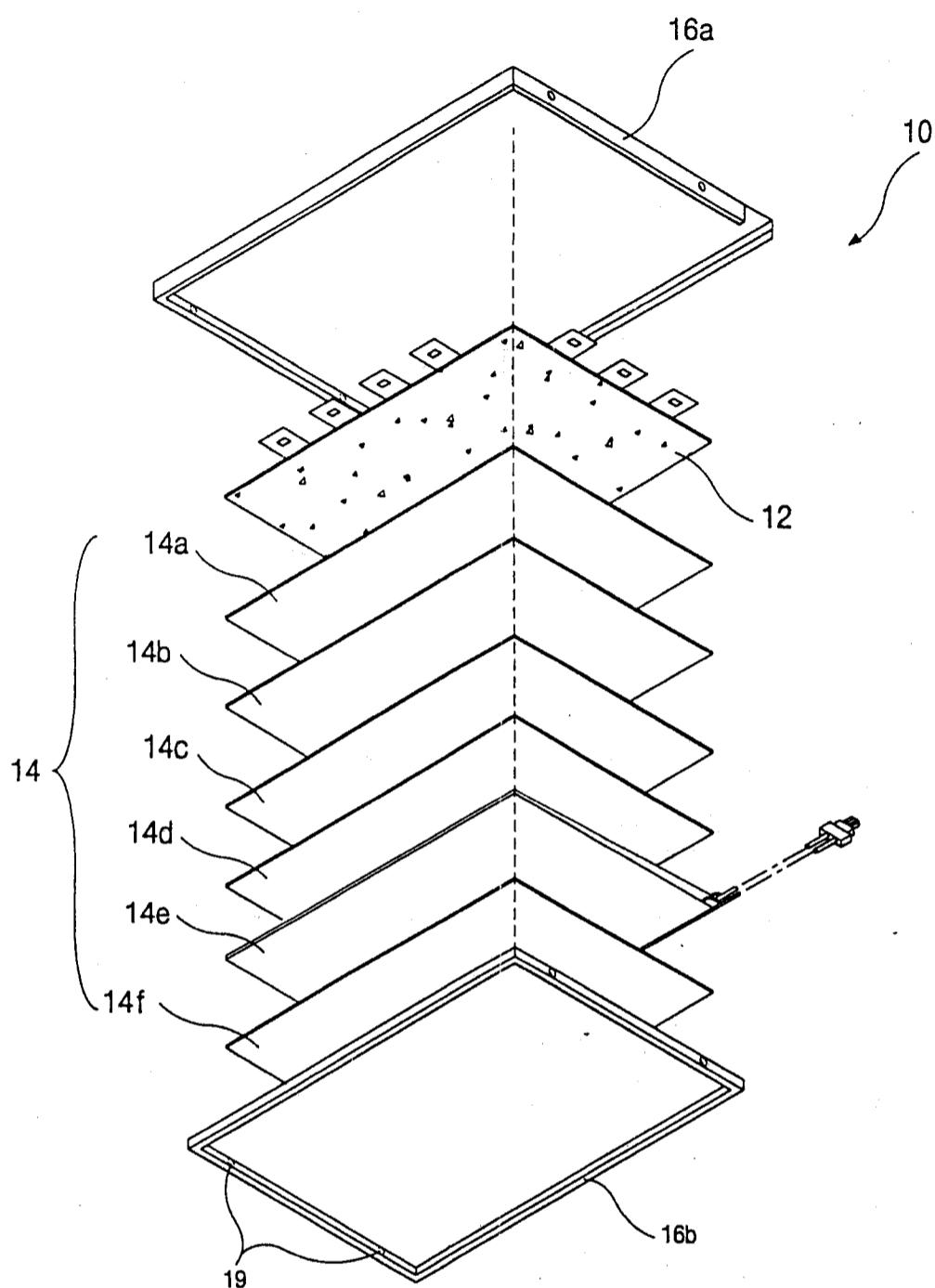
FIG. 10c

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**FIG. 11**

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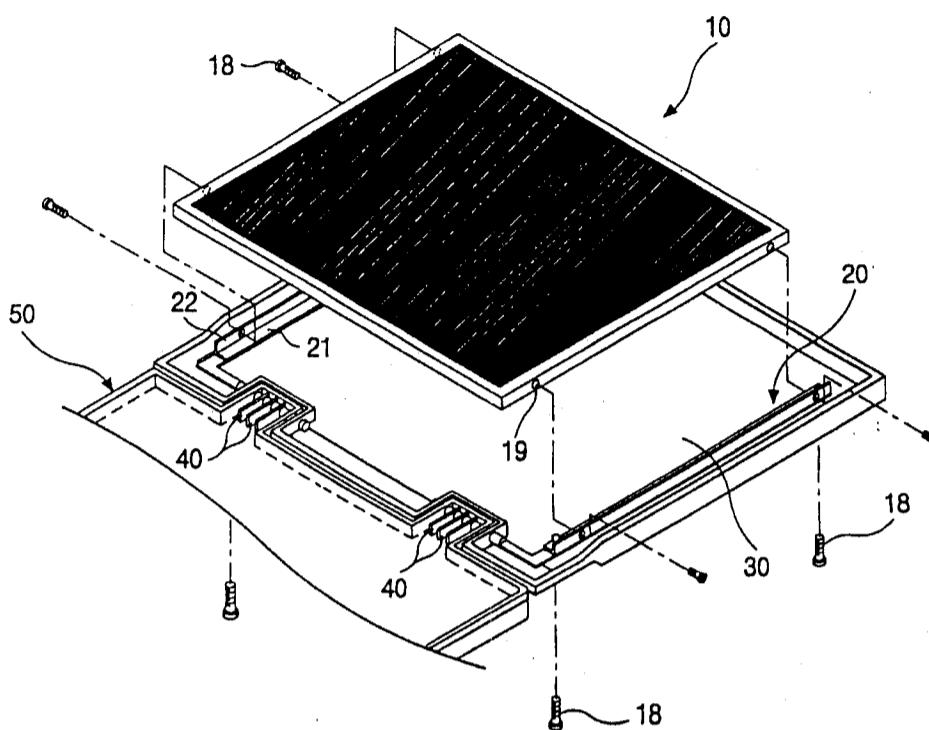


FIG. 12

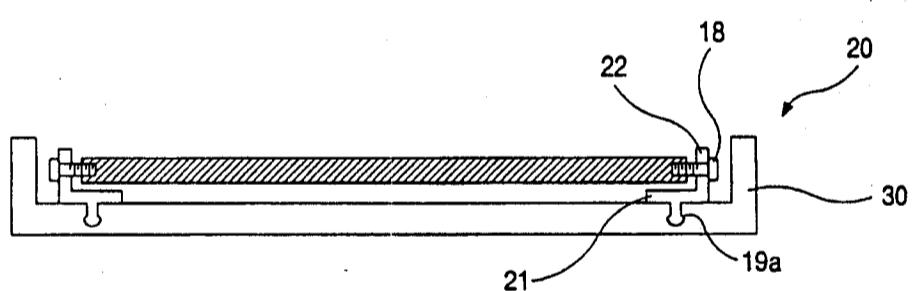


FIG. 13

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VS078252

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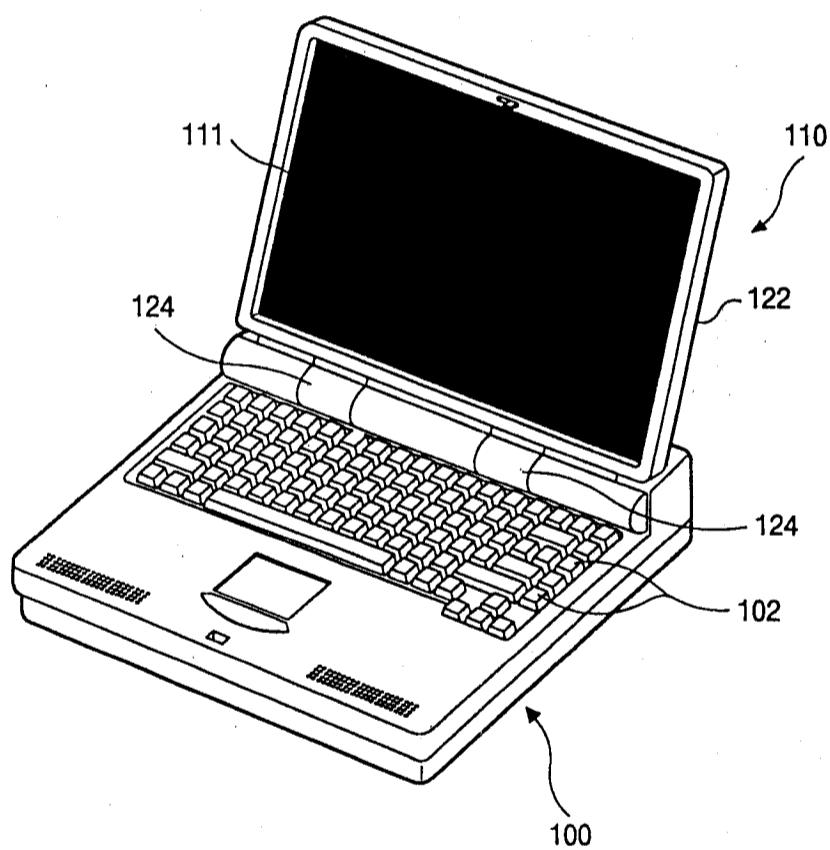


FIG. 1

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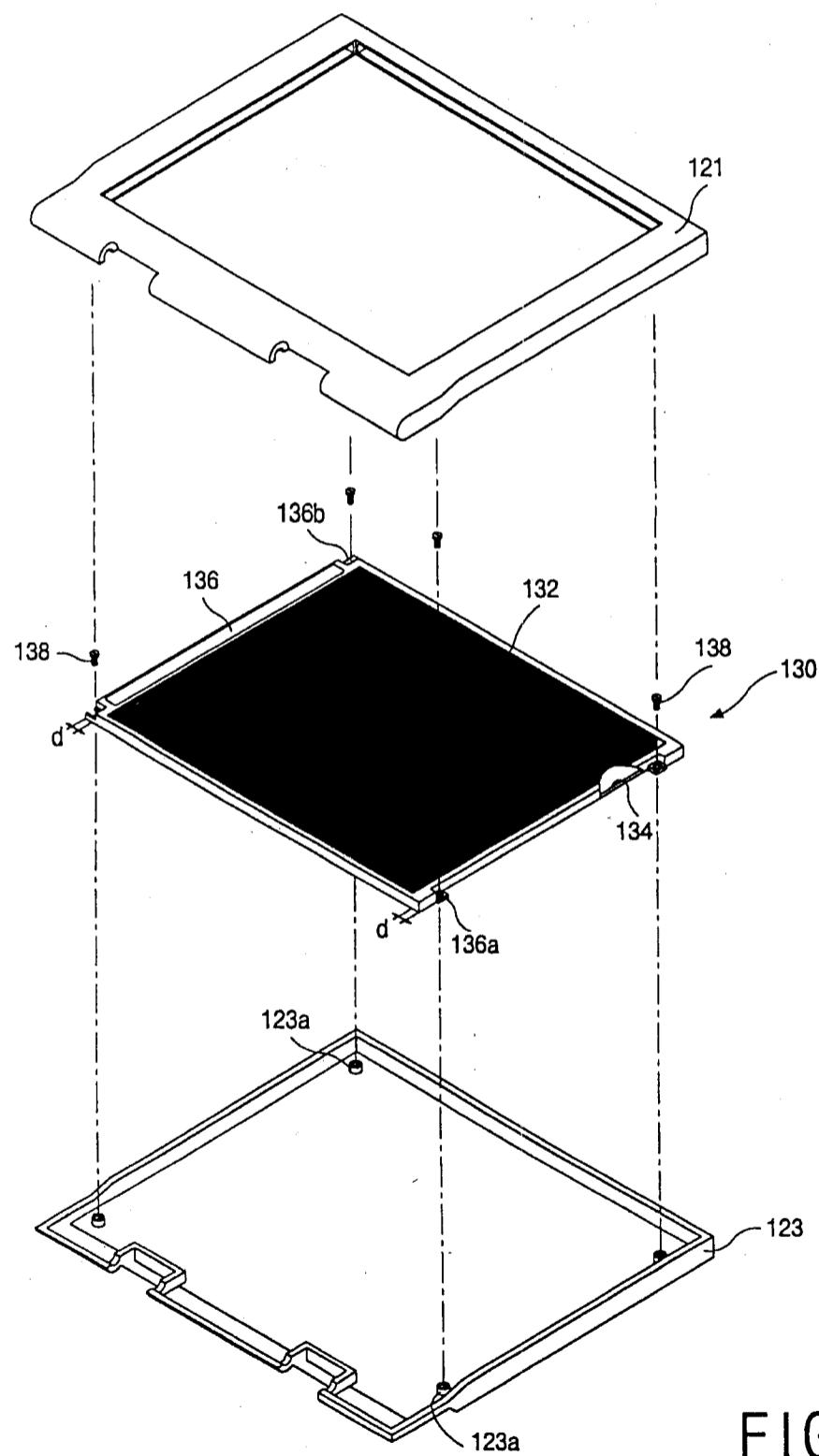


FIG. 2

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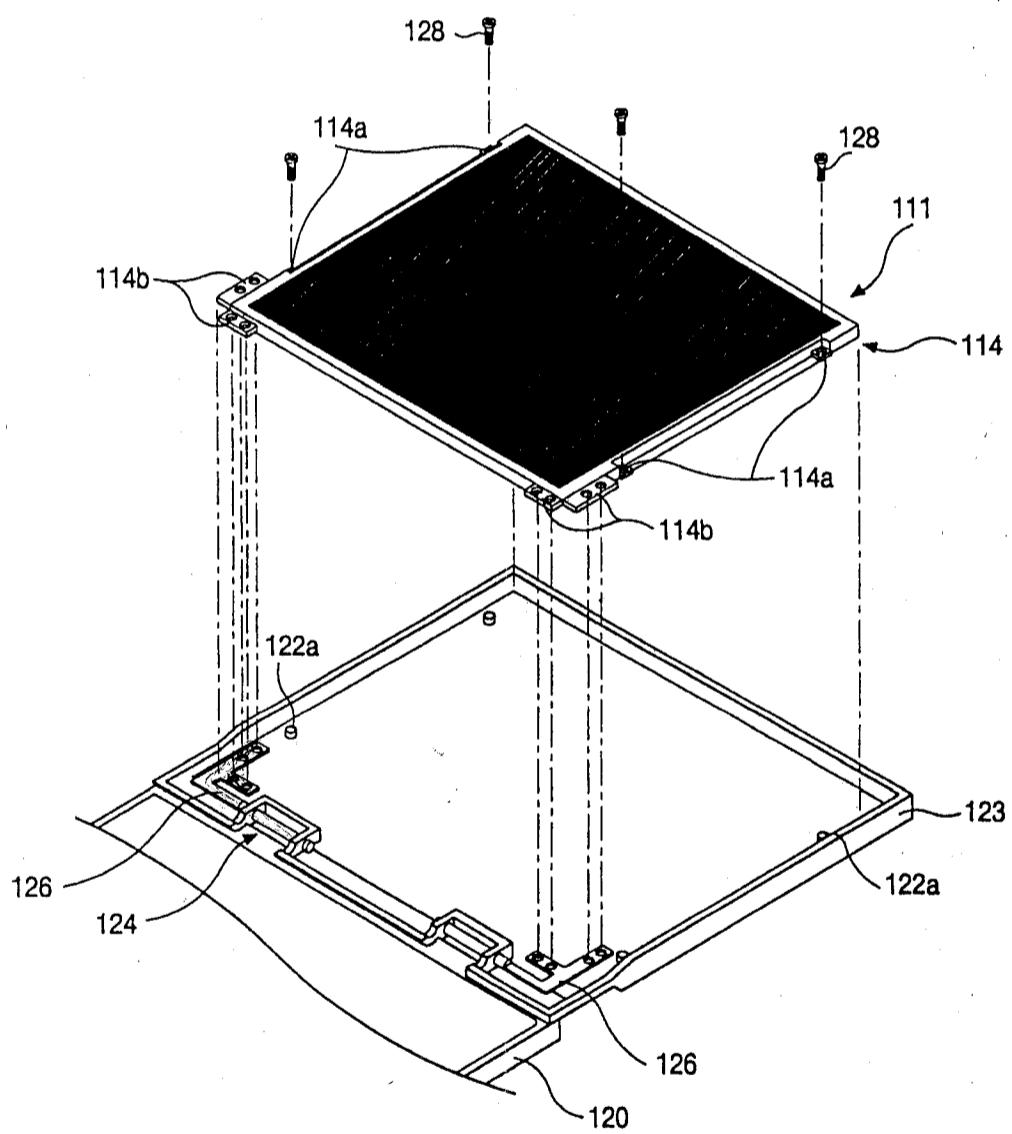


FIG. 3A

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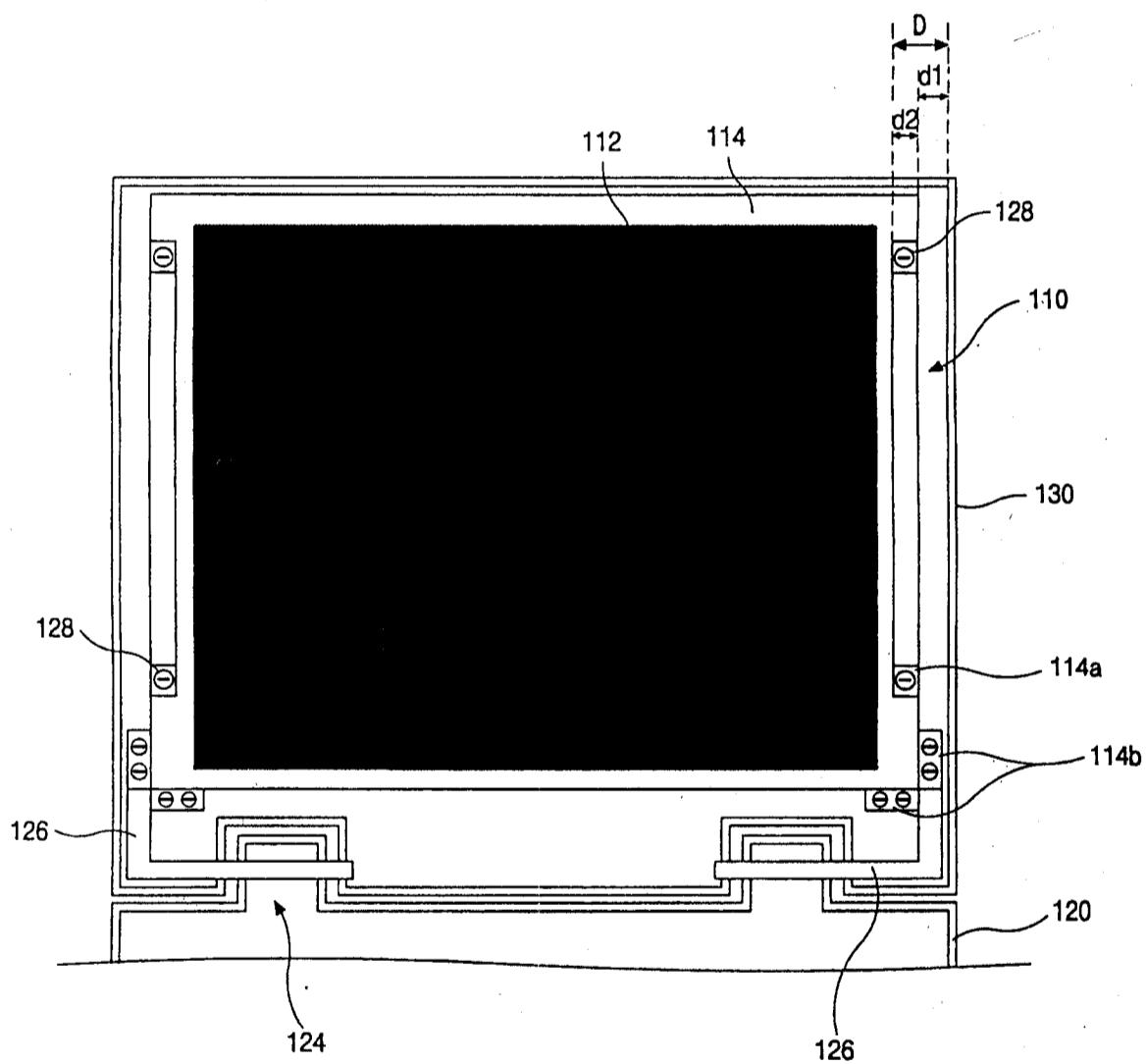


FIG. 3B

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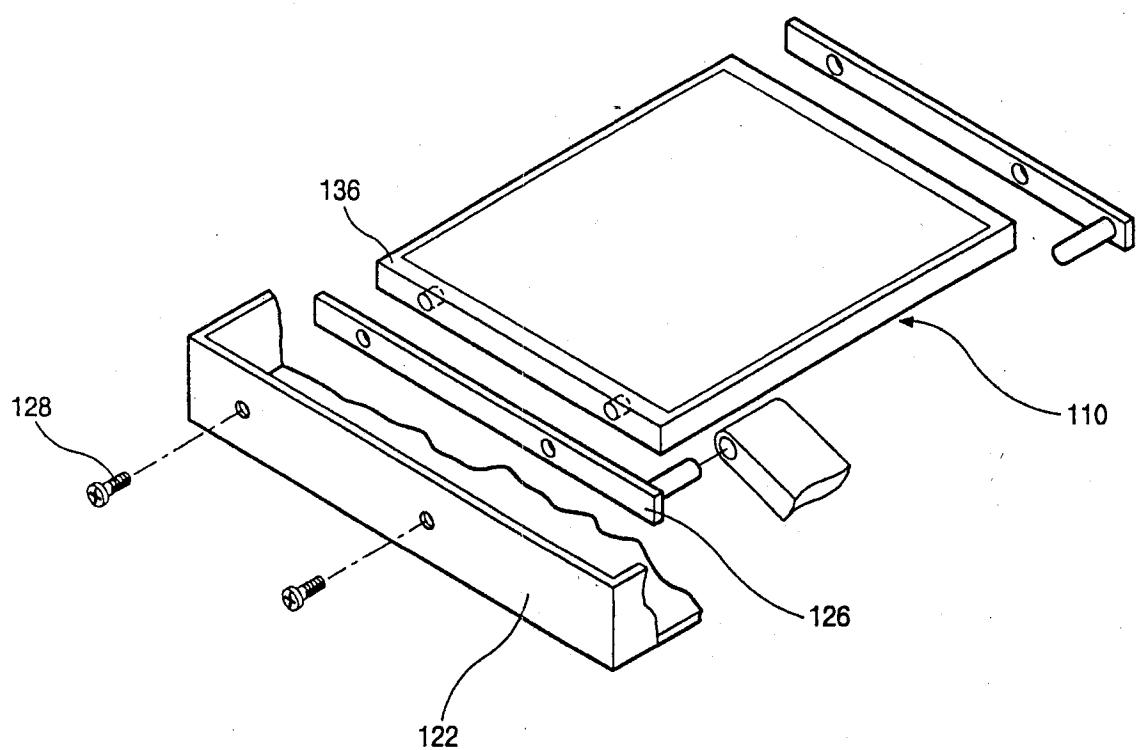


FIG. 4

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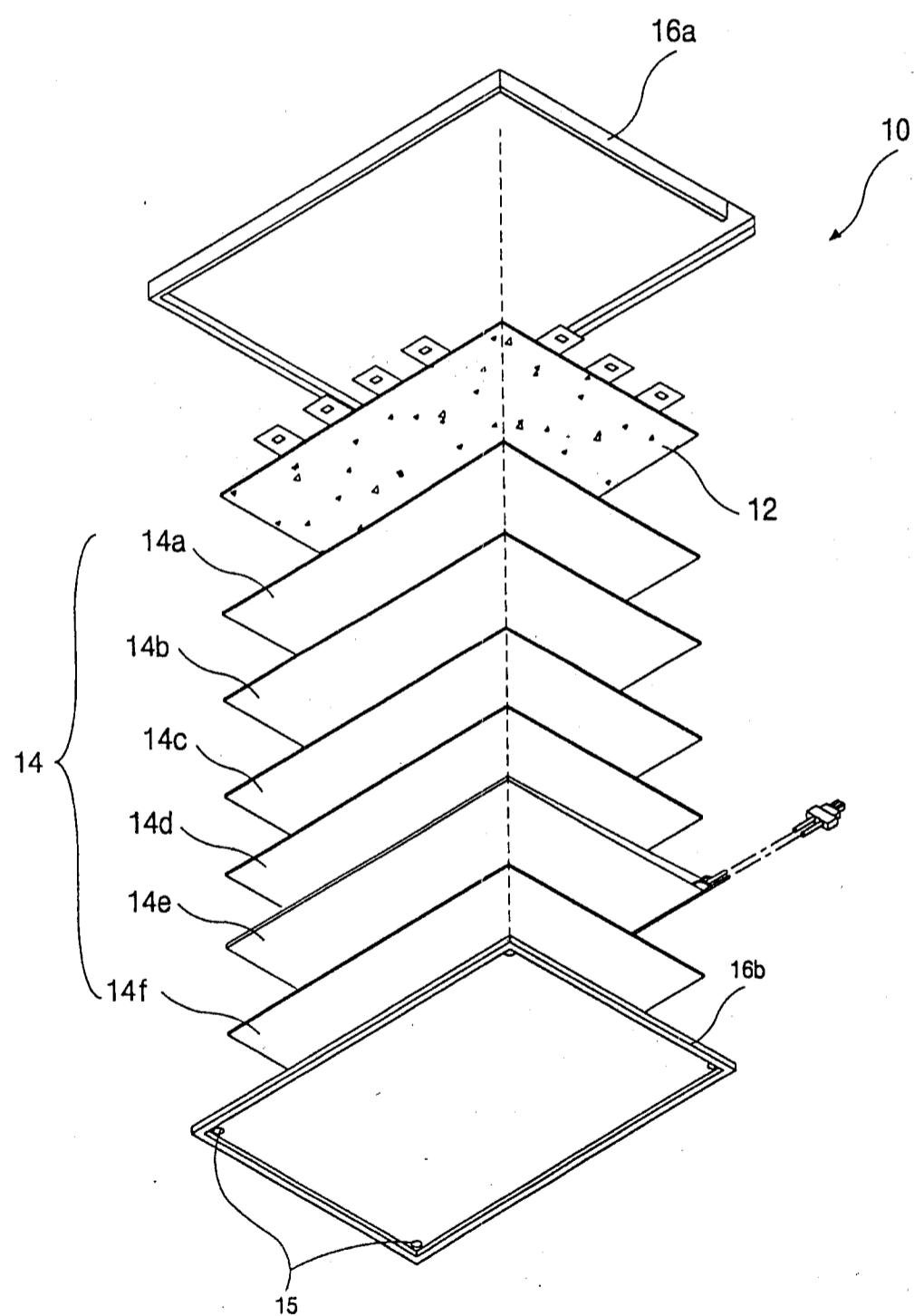


FIG. 5

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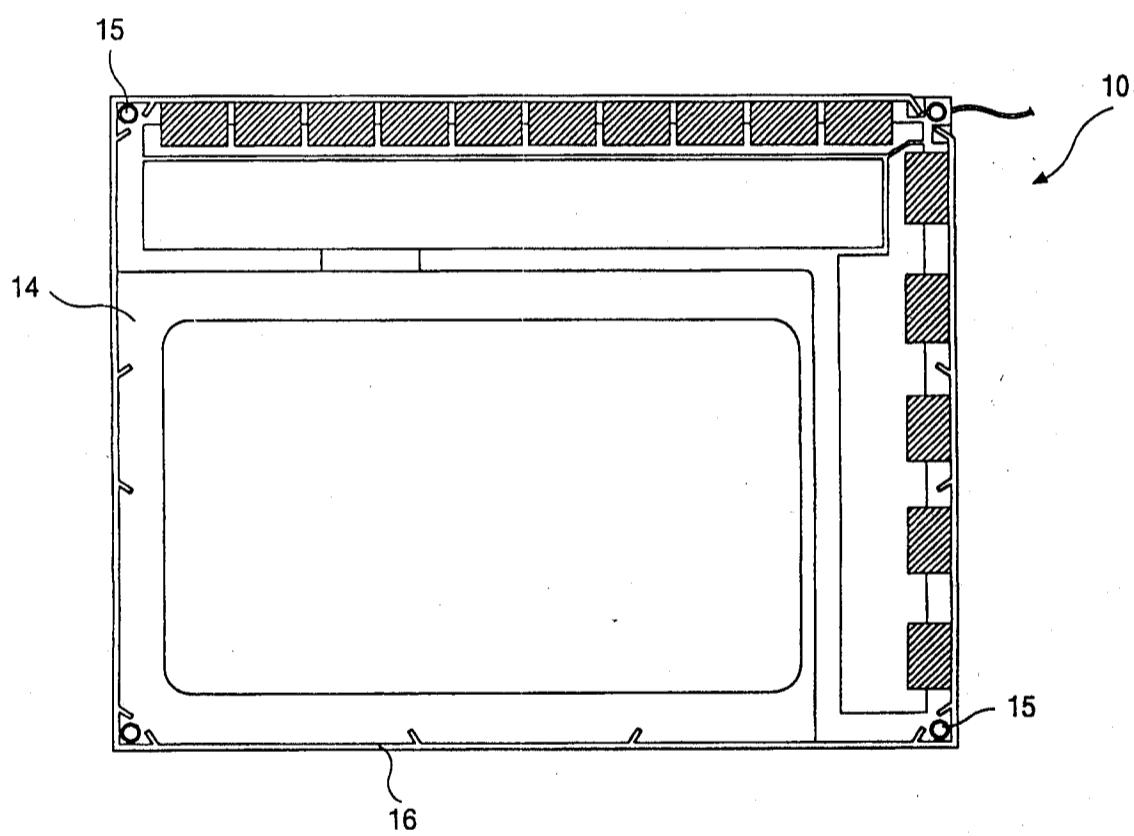


FIG. 6

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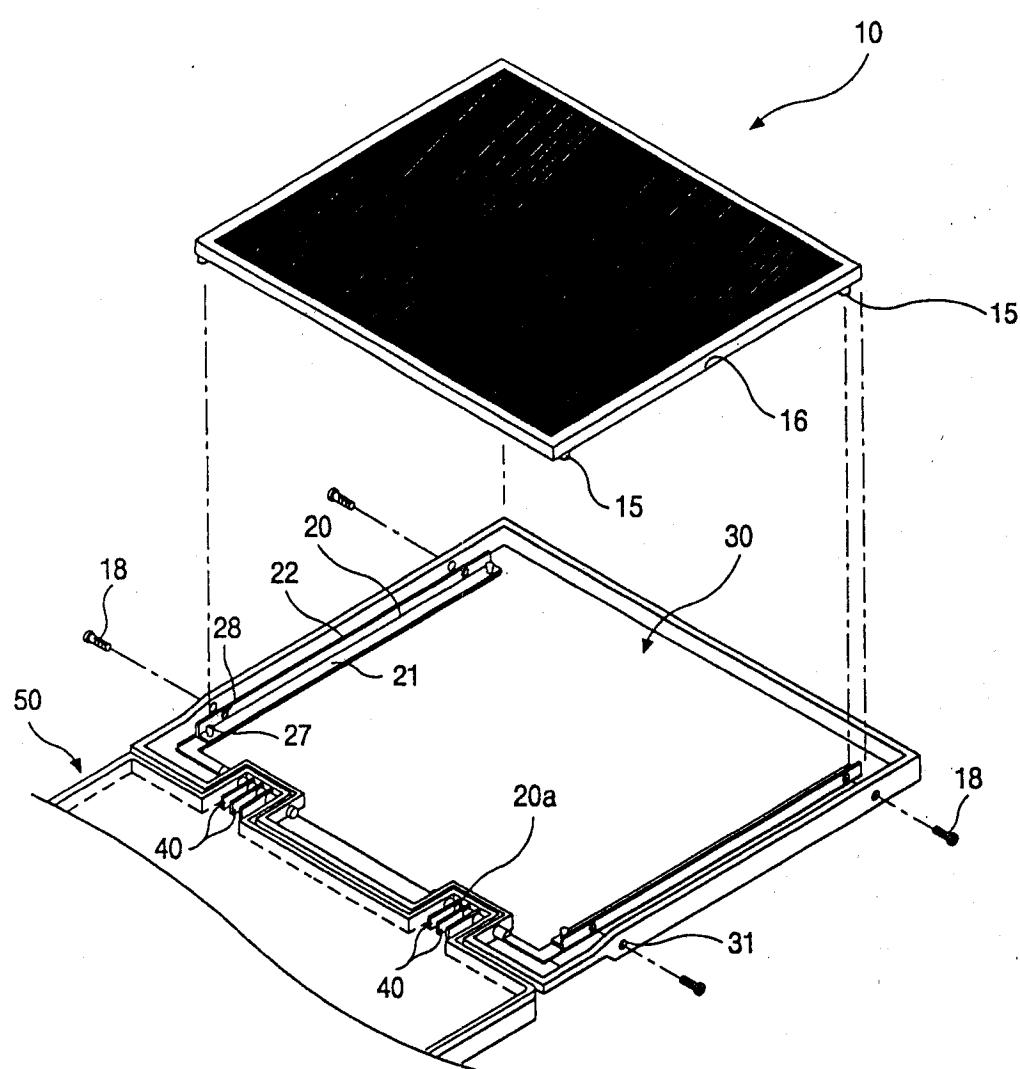


FIG. 7

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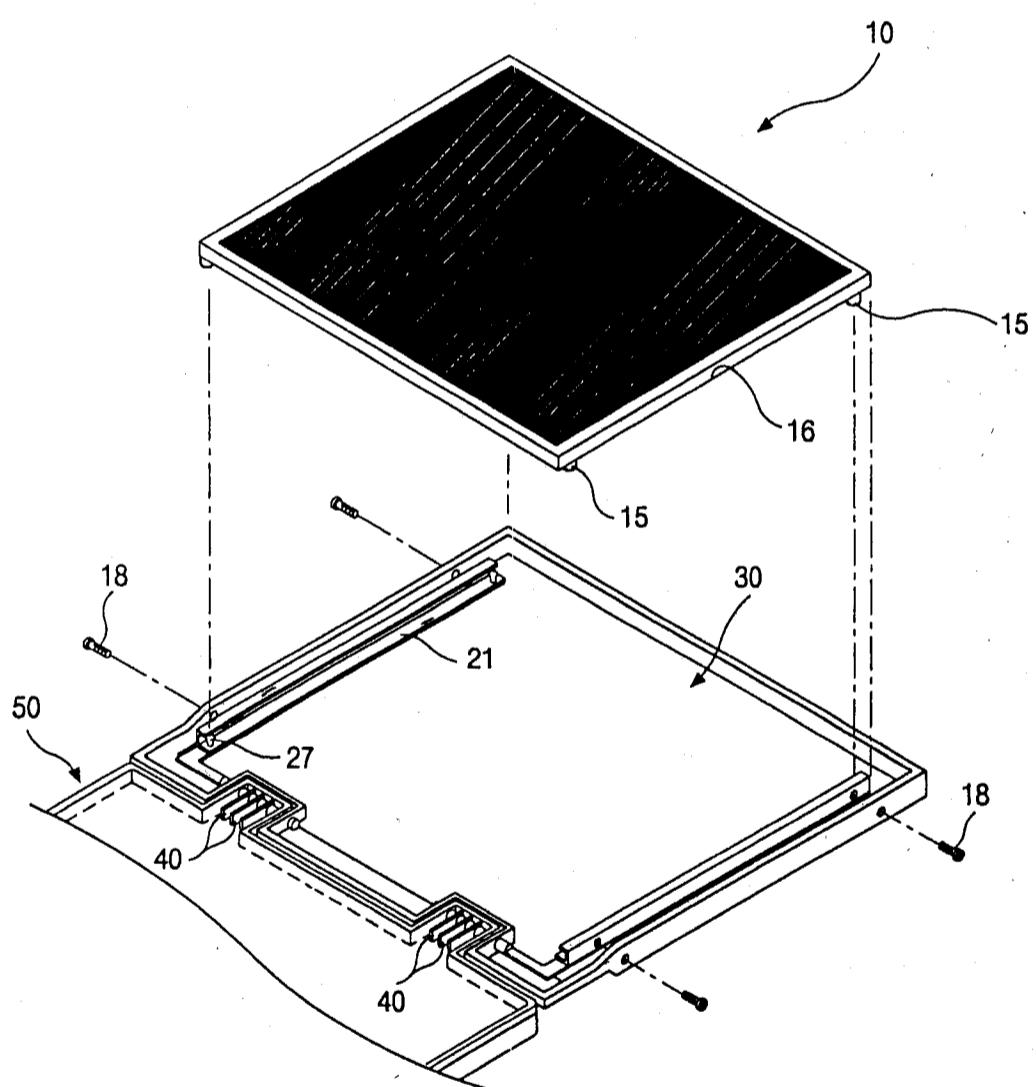


FIG. 8

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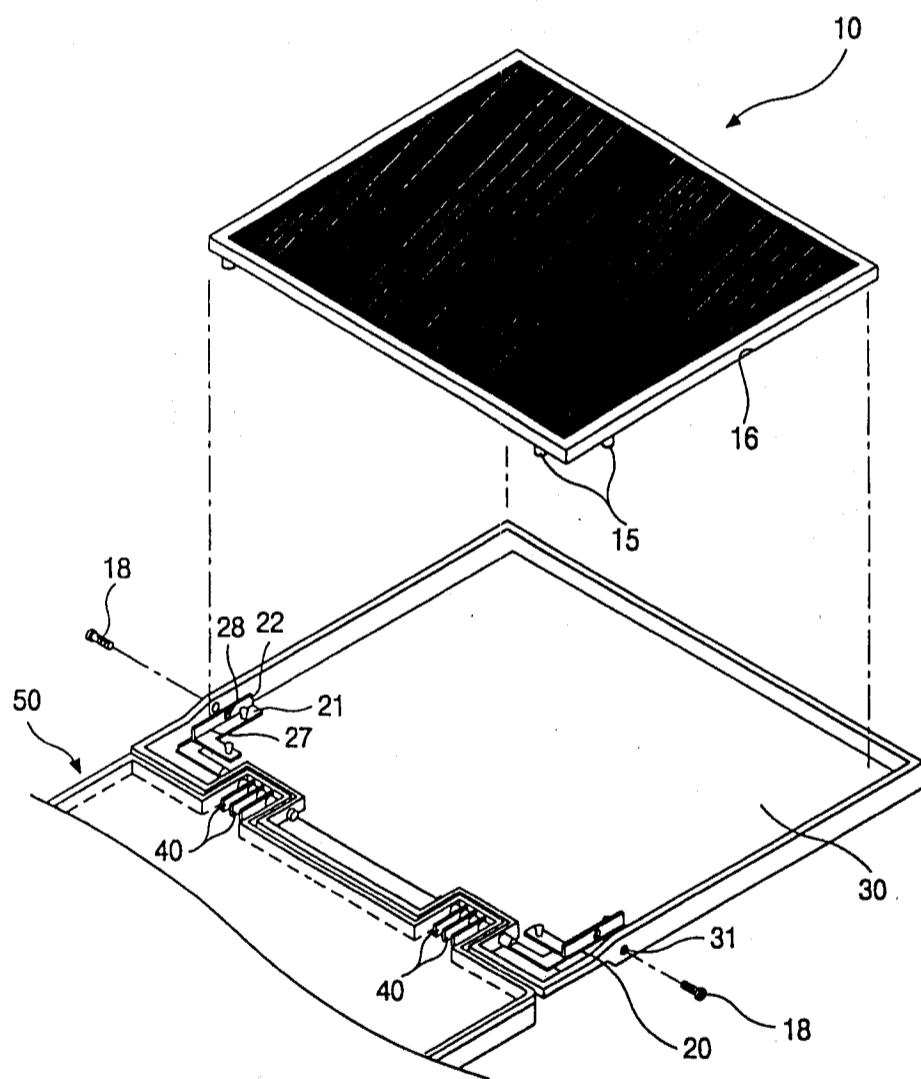


FIG. 9

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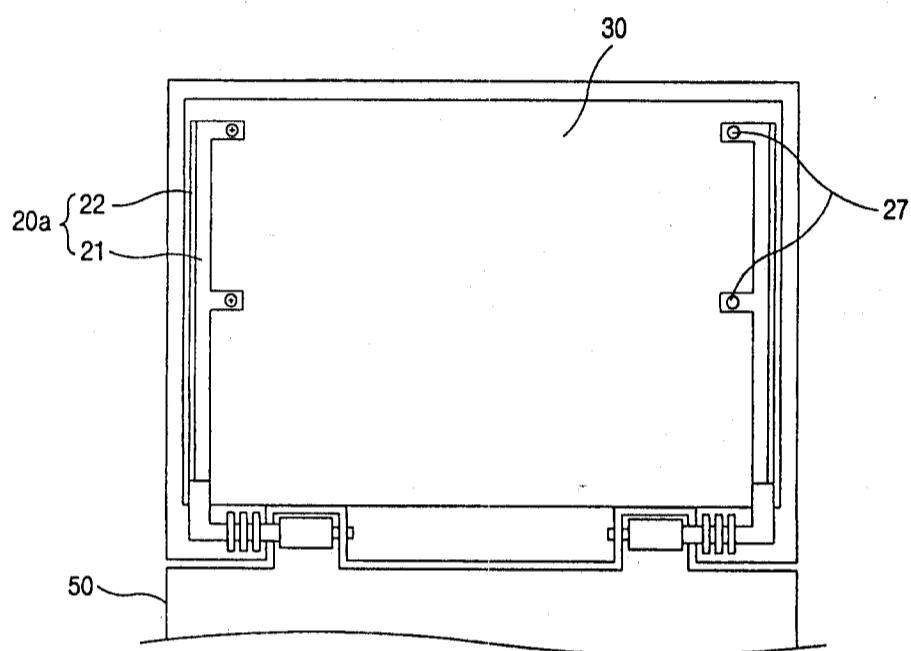


FIG. 10a

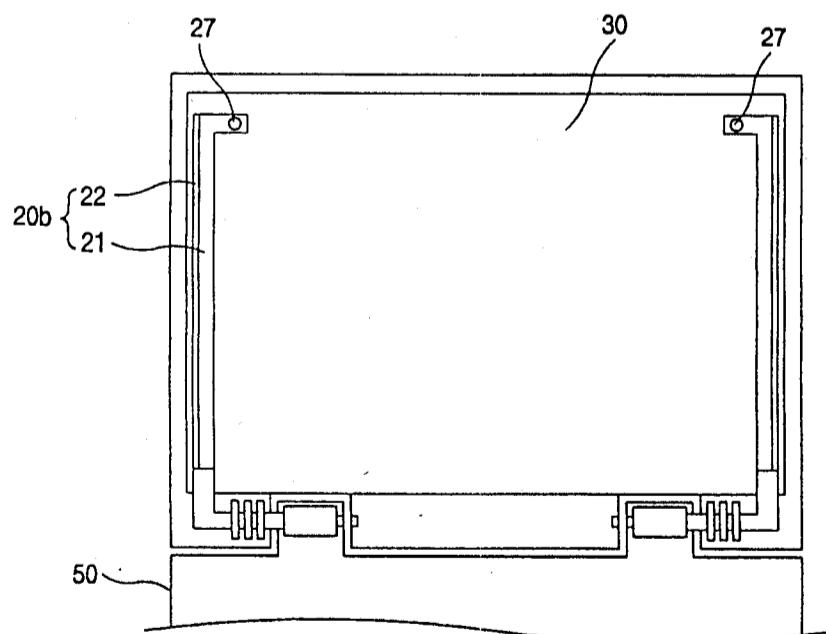


FIG. 10b

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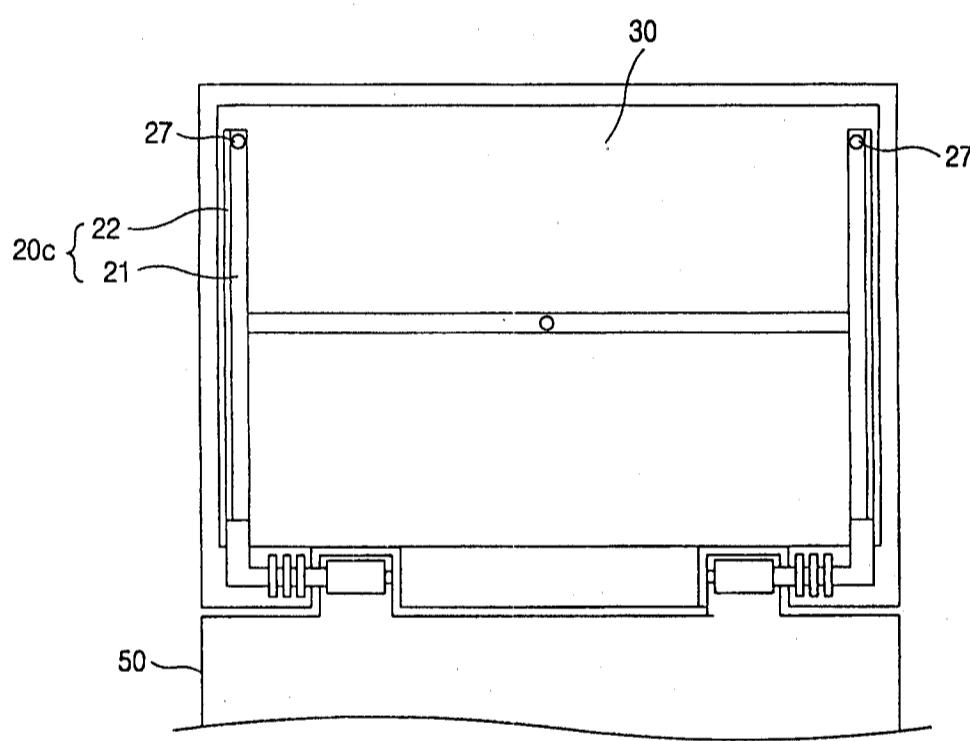


FIG. 10c

13/14

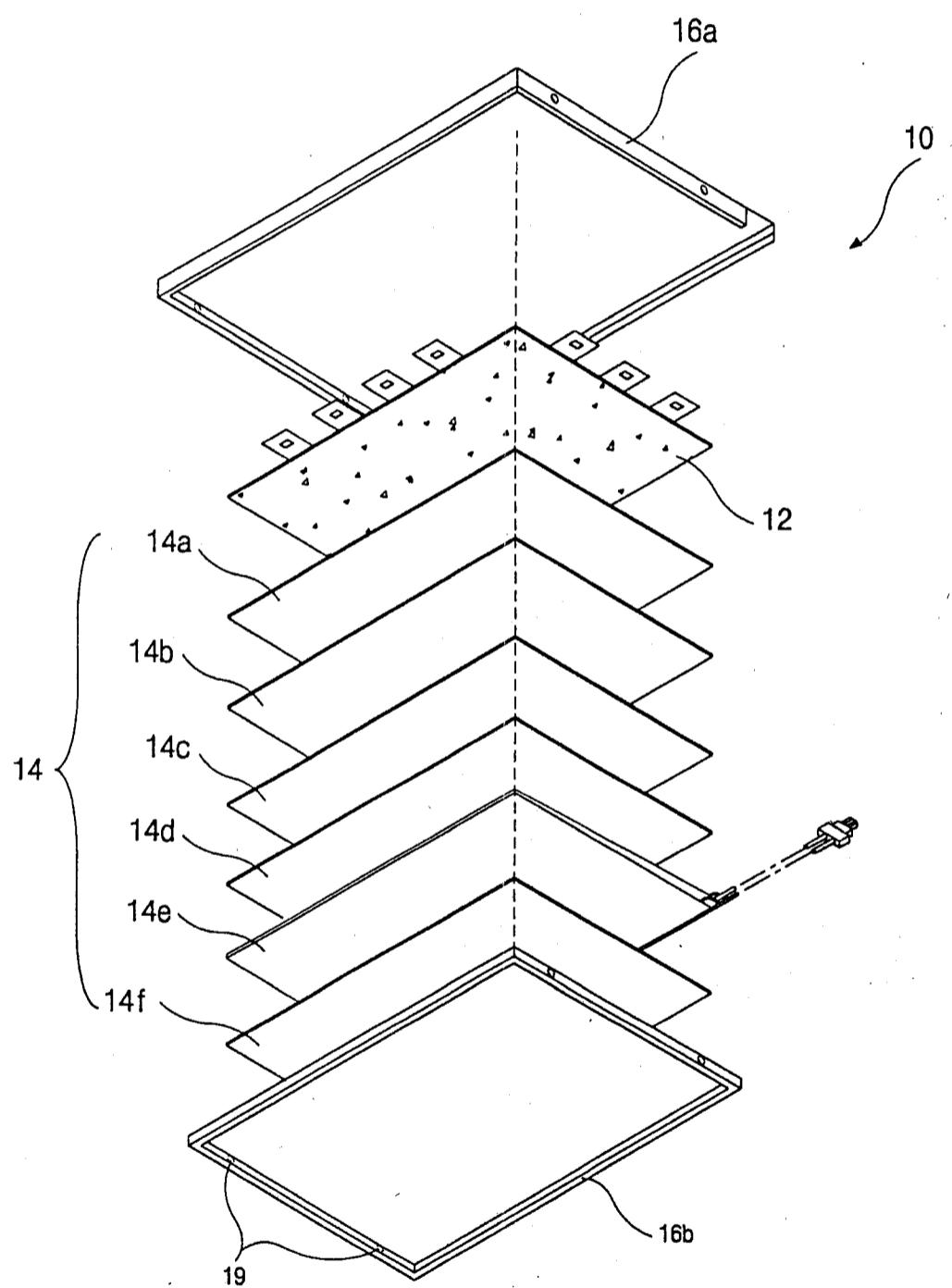


FIG. 11

14/14

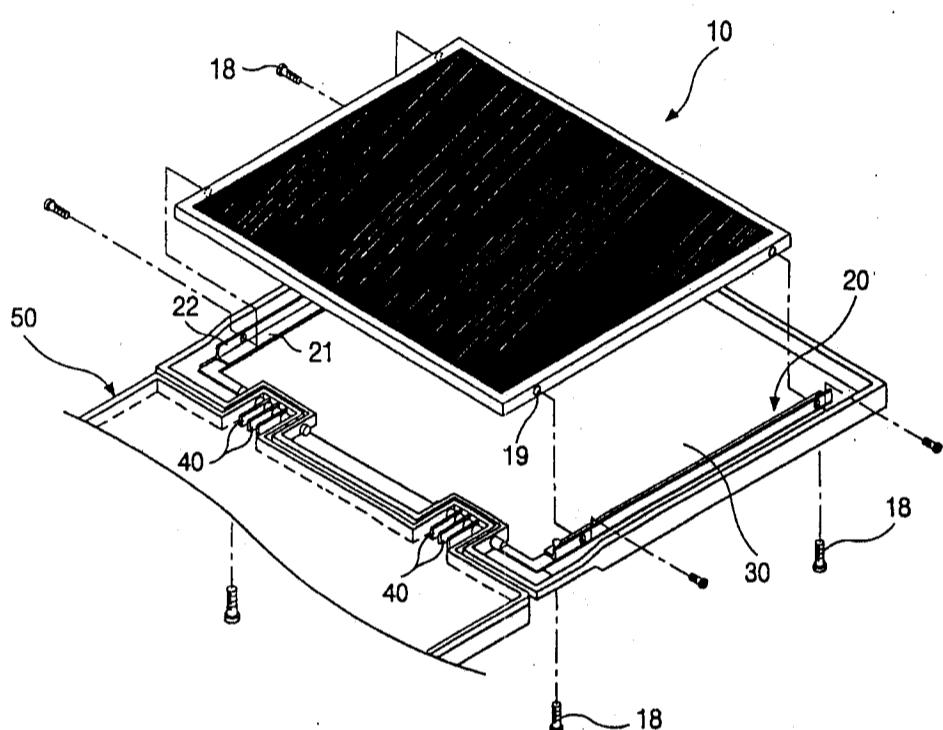


FIG. 12

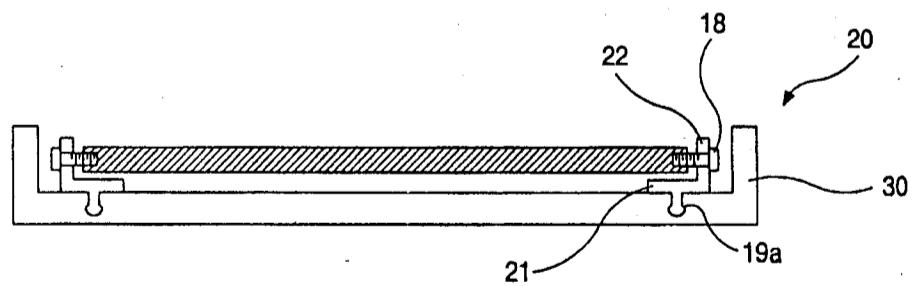


FIG. 13

Docket No. 8733.20067

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Young Woo CHO, et al.

GAU: TBA

SERIAL NO: To Be Assigned

EXAMINER: TBA

FILED: November 10, 1999

FOR: Portable Computer and Method for Mounting a Flat Panel Display Device Module

## REQUEST FOR PRIORITY

JC542 U.S. PTO  
 09/43722  
 11/10/99


ASSISTANT COMMISSIONER FOR PATENTS  
WASHINGTON, D.C. 20231

SIR:

Full benefit of the filing date of U.S. Application Serial Number [US App No], filed [US App Dt], is claimed pursuant to the provisions of 35 U.S.C. §120.

Full benefit of the filing date of U.S. Provisional Application Serial Number , filed , is claimed pursuant to the provisions of 35 U.S.C. §119(e).

Applicants claim any right to priority from any earlier filed applications to which they may be entitled pursuant to the provisions of 35 U.S.C. §119, as noted below.

In the matter of the above-identified application for patent, notice is hereby given that the applicants claim as priority:

<u>COUNTRY</u>	<u>APPLICATION NUMBER</u>	<u>MONTH/DAY/YEAR</u>
KOREA	1998-48265	November 11, 1998

Certified copies of the corresponding Convention Application(s)

are submitted herewith

will be submitted prior to payment of the Final Fee

were filed in prior application Serial No. filed

were submitted to the International Bureau in PCT Application Number .  
Receipt of the certified copies by the International Bureau in a timely manner under PCT Rule 17.1(a) has been acknowledged as evidenced by the attached PCT/IB/304.

(A) Application Serial No.(s) were filed in prior application Serial No. filed ; and  
 (B) Application Serial No.(s)

are submitted herewith

will be submitted prior to payment of the Final Fee

Respectfully Submitted,

LONG ALDRIDGE &amp; NORMAN LLP


Kenneth D. Springer  
Registration No. 39,843

Sixth Floor  
701 Pennsylvania Avenue, N.W.  
Washington, D.C. 20004  
Tel. (202) 624-1200  
Fax. (202) 624-1298

Docket No. 8733.20067

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

INVENTOR(S) Young Woo CHO, et al.

SERIAL NO: To Be Assigned

FILING DATE: November 10, 1999

FOR: Portable Computer and Method for Mounting a Flat Panel Display Device Module

**FEE TRANSMITTAL**ASSISTANT COMMISSIONER FOR PATENTS  
WASHINGTON, D.C. 20231

FOR	NUMBER FILED	NUMBER EXTRA	RATE	CALCULATIONS
TOTAL CLAIMS	31 - 20 =	11	× \$18 =	\$198.00
INDEPENDENT CLAIMS	6 - 3 =	3	× \$78 =	\$234.00
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIMS (If applicable)			+ \$260 =	\$0.00
<input checked="" type="checkbox"/> LATE FILING OF DECLARATION			+ \$130 =	\$130.00
			BASIC FEE	\$760.00
			TOTAL OF ABOVE CALCULATIONS	\$1,322.00
<input type="checkbox"/> REDUCTION BY 50% FOR FILING BY SMALL ENTITY				\$0.00
<input type="checkbox"/> FILING IN NON-ENGLISH LANGUAGE			+ \$130 =	\$0.00
<input type="checkbox"/> RECORDATION OF ASSIGNMENT			+ \$40 =	\$0.00
			TOTAL	\$1,322.00

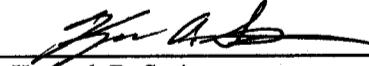
Please charge Deposit Account No. 50-0911 in the amount of A duplicate copy of this sheet is enclosed.

A check in the amount of \$1,322.00 to cover the filing fee is enclosed.

The Commissioner is hereby authorized to charge any additional fees which may be required for the papers being filed herewith and for which no check is enclosed herewith, or credit any overpayment to Deposit Account No. 50-0911.  
A duplicate copy of this sheet is enclosed.

Respectfully Submitted,

LONG ALDRIDGE &amp; NORMAN LLP


Kenneth D. Springer  
Registration No. 39,843Date: November 10, 1999

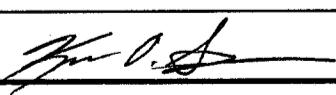
Sixth Floor  
701 Pennsylvania Ave., N.W.  
Washington, D.C. 20004  
Tel. (202) 624-1200  
Fax. (202) 624-1298

11/10/99  
JC710  
U.S.  
PTO59/4322  
11/10/99  
PTO

**UTILITY  
PATENT APPLICATION  
TRANSMITTAL**  
for new nonprovisional applications under 37 CFR 1.53(b)

Attorney Docket No. 8733.20067  
First Inventor or Application Identifier Young Woo CHO  
Title Portable Computer and Method for Mounting a Flat Panel Display Device  
Module

<b>APPLICATION ELEMENTS</b> <small>See MPEP chapter 600 concerning utility patent application contents</small>		ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231	
1. <input checked="" type="checkbox"/> Fee Transmittal Form (e.g. PTO/SB/17) (Submit an original and a duplicate for fee processing)		<b>ACCOMPANYING APPLICATION PARTS</b>	
2. <input checked="" type="checkbox"/> Specification Total Pages <b>20</b>		6. <input type="checkbox"/> Assignment Papers (cover sheet & document(s)) 7. <input type="checkbox"/> 37 C.F.R. §3.73(b) Statement <input type="checkbox"/> Power of Attorney 8. <input type="checkbox"/> English Translation Document (if applicable) 9. <input type="checkbox"/> Information Disclosure Statement (IDS)/PTO-1449 <input type="checkbox"/> Copies of IDS Citations 10. <input type="checkbox"/> Preliminary Amendment 11. <input checked="" type="checkbox"/> White Advance Serial No. Postcard	
3. <input type="checkbox"/> Drawing(s) (35 U.S.C. 113) Total Sheets <b>14</b>		12. <input type="checkbox"/> Small Entity Statement(s) <input type="checkbox"/> Statement filed in prior application. Status still proper and desired.	
4. <input type="checkbox"/> Oath or Declaration Total Pages <b>      </b> <ol style="list-style-type: none"> <li><input type="checkbox"/> Newly executed (original or copy)</li> <li><input checked="" type="checkbox"/> Copy from a prior application (37 C.F.R. §1.63(d)) <small>(for continuation/divisional with box 15 completed)</small></li> </ol> <p>i. <input checked="" type="checkbox"/> <b>DELETION OF INVENTOR(S)</b> <small>Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §1.63(d)(2) and 1.33(b).</small></p>		13. <input type="checkbox"/> Certified Copy of Priority Document(s) <small>(if foreign priority is claimed)</small> 14. <input checked="" type="checkbox"/> Other: <b>List of Inventors' Names and Addresses</b>  <b>Request for Priority</b> <b>Check for \$1,322.00</b>	
5. <input type="checkbox"/> Incorporation By Reference (usable if box 4B is checked) <small>The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4B, is considered to be part of the disclosure of the accompanying application and is hereby incorporated by reference therein.</small>			
15. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below: <input type="checkbox"/> Continuation <input type="checkbox"/> Divisional <input type="checkbox"/> Continuation-in-part (CIP)    of prior application no.: Prior application information:    Examiner:    Group Art Unit:			
16. Amend the specification by inserting before the first line the sentence: <input type="checkbox"/> This application is a <input type="checkbox"/> Continuation <input type="checkbox"/> Division <input type="checkbox"/> Continuation-in-part (CIP) <small>of application Serial No.</small> Filed on			
<input type="checkbox"/> This application claims priority of provisional application Serial No.    Filed			
<b>17. CORRESPONDENCE ADDRESS</b> LONG ALDRIDGE & NORMAN LLP 701 Pennsylvania Avenue, N.W. Washington, D.C. 20004 (202) 624-1200 FACSIMILE: (202) 624-1298			

Name:	Kenneth D. Springer	Registration No.:	39,843
Signature:			Date: November 10, 1999
Name:		Registration No.:	

Page 1 of 1



## UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
 UNITED STATES PATENT AND TRADEMARK OFFICE  
 WASHINGTON, D.C. 20231  
 www.uspto.gov



Bib Data Sheet

CONFIRMATION NO. 7668

SERIAL NUMBER 09/437,222	FILING DATE 11/10/1999 RULE	CLASS 361	GROUP ART UNIT 2835	ATTORNEY DOCKET NO. 8733-20067
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## APPLICANTS

YOUNG WOO CHO, KYONGGI-DO, KOREA, REPUBLIC OF;  
 JONG HWAN KIM, KYONGGI-DO, KOREA, REPUBLIC OF;  
 DAE HEE PARK, KYONGGI-DO, KOREA, REPUBLIC OF;

## \*\* CONTINUING DATA \*\*\*\*\*

## \*\* FOREIGN APPLICATIONS \*\*\*\*\*

REPUBLIC OF KOREA 1998-48265 11/11/1998

## IF REQUIRED, FOREIGN FILING LICENSE GRANTED

\*\* 12/08/1999

Foreign Priority claimed	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no	STATE OR COUNTRY KOREA, REPUBLIC OF	SHEETS DRAWING 14	TOTAL CLAIMS 31	INDEPENDENT CLAIMS 6
35 USC 119 (a-d) conditions met	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after Allowance				
Verified and Acknowledged	Examiner's Signature	Initials			

## ADDRESS

LONG ALDRIDGE & NORMAN LLP  
 701 PENNSYLVANIA AVENUE N W  
 WASHINGTON ,DC 20004

## TITLE

PORTABLE COMPUTER AND METHOD FOR MOUNTING A FLAT DISPLAY DEVICE MODULE

FILING FEE RECEIVED 1438	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees ( Filing ) <input type="checkbox"/> 1.17 Fees ( Processing Ext. of time ) <input type="checkbox"/> 1.18 Fees ( Issue ) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit
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Y 13182328

Application or Docket Number

**PATENT APPLICATION FEE DETERMINATION RECORD**  
Effective November 10, 1998

**CLAIMS AS FILED - PART I**

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE		
TOTAL CLAIMS	31 minus 20 = * 11	
INDEPENDENT CLAIMS	6 minus 3 = * 3	
MULTIPLE DEPENDENT CLAIM PRESENT		

\* If the difference in column 1 is less than zero, enter "0" in column 2

**CLAIMS AS AMENDED - PART II**

(Column 1) (Column 2) (Column 3)

AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
					RATE	ADDITIONAL FEE
Total	*	Minus	**	=	X\$ 9=	
Independent	*	Minus	***	=	X39=	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM						

SMALL ENTITY TYPE	OTHER THAN SMALL ENTITY
OR	
RATE	760.00
X\$18=	198
X78=	234
+260=	
TOTAL	1192

SMALL ENTITY	OTHER THAN SMALL ENTITY
OR	
RATE	ADDITIONAL FEE
X\$18=	
X78=	
+260=	
TOTAL ADDIT. FEE	

AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
					RATE	ADDITIONAL FEE
Total	*	33	Minus	** 33 = 0	X\$ 9=	
Independent	*	7	Minus	*** 7 = 0	X39=	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM						

ADDITIONAL FEE	RATE	ADDITIONAL FEE
X\$18=		
X78=		
+260=		
TOTAL ADDIT. FEE		

AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
					RATE	ADDITIONAL FEE
Total	*	31	Minus	** 33 = 0	X\$ 9=	
Independent	*	6	Minus	*** 7 = 0	X39=	
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM						

ADDITIONAL FEE	RATE	ADDITIONAL FEE
X\$18=		
X78=		
+260=		
TOTAL ADDIT. FEE		

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

\*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.